

Lessons from Federal Pesticide Regulation on the Paradigms and Politics of Environmental Law Reform

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Although reform of federal pesticide regulation is often described as a simple choice between “scientific risk assessments” and “mere politics,” such reductionism assumes away perhaps the fundamental challenge facing progressive reformers: how to improve political and market institutions that minimize trade-offs among deeply held public values. Professor Hornstein argues that an improved framework for environmental law reform, a “cause-oriented approach,” vastly improves the prospects for developing workable incentive structures that can promote a more sustainable agriculture. More broadly, Professor Hornstein develops a positive political theory of pesticide regulation capitalizing on both public choice and public purpose explanations of collective political behavior, to argue that effective regulatory design must openly acknowledge the full complexities of both the “politics” and “science” of environmental protection.

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Introduction

To paraphrase Albert Einstein, environmental problems and solutions should be put as simply as possible—but no simpler.¹ Yet despite such common sense, debates over the reform of environmental law often frame policy disputes too simply. The point is well illustrated by one of the first environmental problems to come before the Clinton Administration and the 103rd Congress: the reform of federal pesticide policy. The policy debate is now framed as a choice between evaluating pesticide residues on processed foods with modern risk assessment techniques or continuing the blanket prohibition of such residues now found in the so-called “Delaney Clause.”² Although described as a referendum on “science” versus “politics, the Delaney debate in fact avoids much of the important science governing pest management, ignores virtually all of the economics of pesticide use, and marginalizes many of the public health and environmental values implicated by agricultural chemicals. To avoid being misunderstood, this criticism does not reflect a conviction that Delaney is necessarily good policy. There is plausible evidence that a blanket prohibition on all detectible carcinogenic residues can be counterproductive.³ But there is also plausible evidence that risk assessments frequently sit atop both suspect data and contentious methodological assumptions. More to the point, the use of risk assessments to discern “reasonable risk” under the Federal Insecticide Fungicide and Rodenticide Act (FIFRA)⁴ has arguably led to one of the most colossal regulatory failures in Washington. Yet despite these well-known criticisms, the Delaney debate continues as if the only policy options for sound pesticide policy—and environmental regulation in general—were the status quo or a new regime dominated by scientific risk assessments. In its persistence and oversimplification, the current debate resembles nothing so much as Winston Churchill’s definition of character: the ability to go from failure to failure without a loss of enthusiasm.⁵

1. I am indebted to Chris Whipple of Clement International Corporation for the attribution of this aphorism to Albert Einstein. Mr. Whipple’s helpfulness, however, should not necessarily be considered support for the arguments I advance here. Mr. Whipple is a thoughtful defender of the risk-oriented reforms this Article critiques.

2. See 21 U.S.C. § 348(c) (1988) (prohibiting pesticide residues and other “food additives” on processed foods “found to induce cancer when ingested by man or animal”). See *infra* text accompanying notes 107, 315-16 (further discussing Delaney Clause).

3. I discuss *infra* at notes 448-50, evidence of the so-called “Delaney paradox” in which application of the Delaney Clause can lead to greater risks than are prevented.

4. 7 U.S.C. §§ 136-136y (Supp. 1991). See *infra* notes 95-101 (discussing FIFRA’s major provisions).

5. Dr. Charles Benbrook recounted this insight of Churchill’s in *Food Safety Issues: Hearings Before the Subcomm. on Department Operations, Research and Foreign Agriculture, of the House Comm. on Agriculture*, 102d Cong., 2d Sess. 78 (1992) (testimony of Dr. Charles Benbrook).

This Article argues for an alternative framework of environmental law reform, one more aggressive in identifying and addressing the causes of environmental problems than either existing regulatory programs or reform proposals that emphasize risk-based priority-setting. This alternative framework would focus especially on the role played by existing economic incentives in causing environmental problems and the role that better-designed incentives can play in solving them. And, although any system of responsible environmental regulation cannot ignore questions of cost or scientific estimates of risk, the alternative framework suggested here would integrate such information into a flexible, solution-oriented regulatory structure that reflects both the dangers of asking more of risk assessments than they can deliver and the importance of honoring nonscientific values that inevitably drive our collective preferences for environmental policy.

After distinguishing in Part I reform strategies that focus on the risk-based effects of environmental contamination from those that focus on underlying causes, I apply the distinction in Part II to the current dialogue on pesticide regulation. There, I argue that reformers who urge exclusive attention to the risk-based effects of pesticides offer no real reform at all. Although recent litigation over the Delaney Clause has precipitated political tensions that can, and should, be temporarily defused,⁶ the opportunity for meaningful reform would be squandered merely by replacing Delaney with a risk-based strategy of "counting" environmental effects such as cancers, birth defects, contaminated aquifers, and fish kills. Indeed, it is precisely this strategy that has spawned two decades of failure under FIFRA. In contrast, a cause-based approach to pesticide regulation would emphasize pest control technologies that can reduce pesticide use without significantly decreasing crop yields or growers' profitability. A cause-based approach would also address existing economic incentive structures that lead growers to forego improved technologies in favor of pesticide use which actually exceeds economically optimal levels.

Part III takes up the important question of "politics." The question is important because, as I've argued in an earlier work,⁷ risk-based decision-making is grounded in expected utility theory, which does not insist on a single rational way for society to make decisions about environmental risks.

6. An obvious starting (and perhaps ending) point would be for Congress to toll the enforcement of the Delaney Clause for a reasonably short period of time (say, six months to one year) to allow Members the opportunity to reframe the debate over pesticide policy into more fundamental questions about meaningful reform. Of course, during the pendency of this enforcement moratorium, the Environmental Protection Agency could still proceed with the numerous adjudications and rulemakings occasioned by the order of the Ninth Circuit Court of Appeals in *Les v. Reilly*, 968 F.2d 985 (9th Cir. 1992), *cert. denied*, 113 S. Ct. 1361 (1993); the Agency simply would be prohibited from reaching final decisions on Delaney-related matters during the moratorium.

7. See Donald T. Hornstein, *Reclaiming Environmental Law: A Normative Critique of Comparative Risk Analysis*, 92 COLUM. L. REV. 562 (1992).

Rather, the founders of expected utility theory acknowledged that society must employ collective mechanisms to form social policies toward risk. Thus, those who view reform merely as a matter of “science” versus “politics” dangerously oversimplify; not only is there a political dimension to the type of science these reformers choose to emphasize, but their apparent disdain for everyone else’s politics is hardly a matter of scientific truth. Yet politics, or rather, a theory of politics, can pose more complex theoretical questions for environmental law reform. If, for example, public-choice or other “capture” theories of politics are roughly correct, then risk-based scientific expertise—however incomplete or nonobjective—might still offer improvements in public decisionmaking over systematically skewed political outcomes. On the other hand, if politics is more commendable than capture theories suggest, then risk-based decisionmaking—especially if it reflects a hidden political structure of its own—might do vastly more harm than good. I develop in Part III a positive political theory of federal pesticide regulation to test the various possibilities. I conclude that the political history of pesticide regulation undermines any single political theory of environmentalism—there is ample evidence to reflect both private-interest-regarding and public-interest-regarding outcomes and processes. There is also evidence that legislators have long used risk-based decisionmaking both procedurally and symbolically to favor political outcomes rather than simply to arrive at scientific truth. If the reader is left gasping at the quaintness of these conclusions, it is important to appreciate that they are not without significant implications. If politics are not as bad, and risk-based decisionmaking not as neutral, as risk-based reformers claim, then we are seriously misled to believe that reform is simply a matter of choosing “good” science in lieu of outcomes we are told to despise as “politics.” More constructively, if we open ourselves to the complexities of both science and politics, there are reasons to believe that the cause-based reforms advocated here can better frame meaningful debates over environmental law reform and, by recognizing the limits of each, make the most out of both science and politics.

I. The Debate over Environmental Law Reform

There has always been a spirited debate over the proper form of modern environmental regulation. The 1970 Clean Air Act Amendments⁸ and the 1972 Federal Water Pollution Control Amendments⁹ emphasized, respectively, the so-called “environmental-quality” and “technology-based” approaches to

8. Clean Air Act Amendments of 1970, Pub. L. No. 91-604, 84 Stat. 1676 (codified at 42 U.S.C. §§ 7401-7671q (1988)).

9. Federal Water Pollution Control Act Amendments of 1972, Pub. L. No. 92-240, 86 Stat. 47 (codified at 33 U.S.C. §§ 1251-1386 (1988)).

pollution control,¹⁰ yet both statutes were roundly criticized for imposing overly rigid bureaucratic commands that resulted in inefficiencies: both over-control and undercontrol in different parts of the economy.¹¹ Although modest attempts at flexibility were subsequently made,¹² the basic command-and-control structure of regulation survived not only in the federal air and water programs, but also in newly fashioned regulatory programs aimed at toxic chemicals under the Resource Conservation and Recovery Act (RCRA)¹³ and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or Superfund).¹⁴ By 1985, the central debate over environmental law reform was captured in a much-noted exchange between Professor Howard Latin, who defended uniform, technology-based regulation in the name of administrability,¹⁵ and Professors Bruce Ackerman and Richard Stewart, who argued for the use of more flexible, market-like mechanisms in the name of

10. "Environmental-quality-based" (or "media-quality-based") approaches decide first on the level of acceptable public health or environmental risks and then calculate the appropriate level of regulatory action needed to achieve the goal. JOHN E. BONINE & THOMAS O. MCGARITY, *THE LAW OF ENVIRONMENTAL PROTECTION* 215 (2d ed. 1992). Typically, such approaches do not tolerate any significant risk and impose regulatory requirements without regard to cost or technological feasibility. See Thomas O. McGarity, *Media-Quality, Technology, and Cost-Benefit Balancing Strategies for Health and Environmental Regulation*, 46 LAW & CONTEMP. PROBS. 159, 159-60 (Summer 1983). In contrast, "technology-based" approaches do not tolerate risks that can "feasibly" be eliminated and begin the regulatory enterprise with an inquiry into technological and economic feasibility. See BONINE & MCGARITY, *supra* at 216.

Although parts of the Clean Air Act are generally associated with environmental-quality-based regulation, see, e.g., Clean Air Act § 109(b)(1), 42 U.S.C. § 7409(b)(1) (Supp. 1990) (requiring air quality standards for criteria air pollutants to be established without regard to cost and based on an adequate margin of safety) and parts of the Clean Water Act with technology-based regulation, see, e.g., Clean Water Act §§ 301(b)(2)(E), 304(b)(4), 33 U.S.C. §§ 1311(b)(2)(E), 1314(b)(4) (1988) (providing for best conventional pollutant control technology considering economic feasibility under a limited cost-benefit test), the two statutes are more accurately viewed as ideological blends of the two approaches, see, e.g., Clean Air Act § 112(d)(2), 42 U.S.C. § 7412(d)(2) (Supp. 1990) (maximum achievable degree of emission reduction of hazardous air pollutants taking cost into consideration); Clean Water Act § 311(b)(3), 33 U.S.C. § 1321(b)(3) (1988) (prohibiting discharge of oil in any quantities that may be harmful).

11. See, e.g., James E. Krier, *The Irrational National Air Quality Standards: Macro- and Micro-Mistakes*, 22 UCLA L. REV. 323, 327-28 (1974) (uniformly imposed national standards are inefficient because they deny states the "equally legitimate" choice of growth over health and they ignore the variances in "costs of pollution" across the country).

12. See, e.g., Clean Air Act, 42 U.S.C. § 7411(j) (1988) (waivers for innovative technological systems); Clean Water Act, 33 U.S.C. § 1311(k) (1988) (extensions of compliance deadlines available if "innovative production processes" are used). See generally Richard B. Stewart, *Regulation, Innovation, and Administrative Law: A Conceptual Framework*, 69 CAL. L. REV. 1256 (1981) (addressing interaction of regulation and innovation and arguing for more incentive-minded regulatory policies).

13. 42 U.S.C. §§ 6901-6992g (1988) (adopting a "cradle-to-grave" regulatory scheme).

14. 42 U.S.C. §§ 9601-9675 (1988). Although Superfund (and the 1986 Superfund Amendment and Reauthorization Act) emphasizes approaches that vary from the command-and-control model (for example, the liability and right-to-know provisions), there is also an extremely active "regulatory" program that superintends the listing of cleanup sites on the National Priorities List as well as the selection of technological remedies at those sites; see *id.* § 9605 (a), (c) (use of national contingency plan to guide selection of cost-effective remedies and of hazard ranking system to select and prioritize clean-up sites).

15. Howard Latin, *Ideal Versus Real Regulatory Efficiency: Implementation of Uniform Standards and 'Fine-Tuning' Regulatory Reforms*, 37 STAN. L. REV. 1267, 1332 (1985) (arguing that economic incentive-based regulation would increase decisionmaking costs and create "opportunities for manipulative behavior by regulated parties").

economic efficiency.¹⁶ The outcome of this debate, however, was relatively undramatic, with federal programs retaining their command-and-control structures albeit with the occasional nod toward more flexible regulatory commands¹⁷ and even the use of limited market-like mechanisms of social control.¹⁸

The lack of closure, however, ensured that arguments for basic reform would continue. Driving these arguments in part were the annual costs of complying with environmental regulations, which began to hover in the neighborhood of two and three percent of the country's gross domestic product (\$115 billion in 1990 and growing), causing some critics to complain that this level of expenditure was unjustified by the sometimes intangible benefits achieved.¹⁹ Equally strident critics argued that present efforts were insufficient, citing evidence that significant public health risks and environmental degradation continued *despite* these massive clean-up expenditures.²⁰ A variety of other important criticisms were made:

16. Bruce A. Ackerman & Richard B. Stewart, Comment, *Reforming Environmental Law*, 37 STAN. L. REV. 1333, 1364 (1985) ("[t]o focus on administrative costs, without considering the societal benefits of more intelligent regulation, produces penny-wise but pound-foolish public policies"). See also Bruce A. Ackerman & Richard B. Stewart, *Reforming Environmental Law: The Democratic Case for Market Incentives*, 13 COLUM. J. ENVTL. L. 171, 189 (1988) (technology-based regulation focuses public attention on arcane technological questions rather than the more normative question, "[d]uring the next *n* years, should we instruct the EPA gradually to decrease (or increase) the number of pollution rights by *x* percent?"). Professor Stewart has conceded that systems of transferable pollution permits may not be appropriate for problems involving toxic chemicals such as pesticides, either because their risks are not readily quantifiable or because they can present such localized dangers that a sufficiently wide market cannot be defined. See Richard B. Stewart, *Controlling Environmental Risks Through Economic Incentives*, 13 COLUM. J. ENVTL. L. 153, 161 (1988); see also Joel A. Mintz, *Economic Reform of Environmental Protection: A Brief Comment on a Recent Debate*, 15 HARV. ENVTL. L. REV. 149, 151-52 (1991).

17. See, e.g., Stewart, *supra* note 12, at 1268-69 (noting and urging further increased use of "performance standards" over "specification standards" by federal regulators to increase dischargers' flexibility in selecting pollution-control measures).

18. See, e.g., 42 U.S.C. §§ 7651-7651 (Supp. 1991) (tradable emission permit scheme for acid deposition control in 1990 Clean Air Act Amendments); ROBERT LIROFF, *REFORMING AIR POLLUTION REGULATION: THE TOIL AND TROUBLE OF EPA'S BUBBLE* 62-67 (1986) (describing emissions trading scheme in EPA's "bubble" policy for existing sources of air pollution).

19. ENVTL. PROTECTION AGENCY, *ENVIRONMENTAL INVESTMENTS: THE COST OF A CLEAN ENVIRONMENT* ch. 5, at 5-1 to 5-36 (1990). Pollution control expenditures grew from 0.9% of gross national product in 1972 to 2.1% in 1990, see 22 Env't Rep. (BNA) No. 16, at 1065 (Aug. 16, 1991), and are projected to increase to 2.6% (approximately \$170-185 billion annually) by the year 2000, see *Compliance with RCRA, Superfund Rules Hurts Economic Growth, Research Group Says*, 23 Env't Rep. (BNA) No. 7, at 657 (June 12, 1992). For an example of the criticism engendered by this level of expenditure, see *Compliance, Cleanup Costs May Harm Credit for U.S. Companies, Moody's Investor Service Says*, 22 Env't Rep. (BNA) No. 3, at 128 (May 17, 1991) (environmental compliance costs may affect competitive position of U.S. companies). But see *Acid Rain Sections Would Cost \$4.5 Billion, But Could Create 50,000 New Jobs, CRS Reports*, 20 Env't Rep. (BNA) No. 42, at 1777 (Feb. 16, 1990) (Title IV of the 1990 Clean Air Act Amendments can create between 25,000 and 50,000 worker-years of new jobs).

20. Despite massive expenditures under all federal environmental programs, American manufacturing industries released 4.8 billion pounds of toxic chemicals into the environment in 1990. See *Industry Reduced Chemical Releases in 1990, Continuing Trend that Began in 1987, EPA Says*, 23 Env't Rep. (BNA) No. 5, at 424 (May 29, 1992) (reporting results of 1990 Toxic Release Inventory but noting that these discharges were down from the 5.7 billion pounds reported in 1989). As to conventional ("non-toxic") pollutants, emissions of six common air pollutants have only held steady since 1981, with nitrogen

environmental law, it was argued, regulated new technologies excessively; merely sought end-of-the-pipe pollution "management" rather than more fundamental ways to build pollution "prevention" into the country's economic subsystems; ignored inequitable risk distributions; and had lost sight of broader, ecological risks. As these criticisms mounted, the movement to reform environmental law began to coalesce around a different set of competing paradigms.

A. Risk-Oriented Reform: Prospects and Problems

It was perhaps inevitable that the concept of risk-oriented decisionmaking would appeal to proponents of legal and policy reform. Once the basic environmental statutes were enacted and major implementing regulations put in place, the new but inevitable salience of "costs" (both costs to government agencies in terms of administrative resources and compliance costs in dollars to regulated entities) naturally could be expected to raise the question: how much environmental protection are we really buying for our efforts?²¹ Quantitative risk assessments, which could be used to estimate the effects of putative environmental problems and thus the marginal benefits of the government's environmental programs,²² soon raised the tantalizing intellectual prospect of using "risk reduction" as a common metric against which to measure and compare both existing and prospective efforts. The stature of risk reduction as a model was surely enhanced by the growing

oxide emissions actually increasing, leading most analysts to despair of the possibility of any major urban center attaining in the foreseeable future the health standards established as long ago as 1970, see James E. Krier, *The Political Economy of Barry Commoner*, 20 ENVTL. L. 11, 17 (1990). As for water pollution, "average trends in standard measures suggest that the nation has suffered at least a slight decline in surface water quality, despite the supposedly heady requirements of the Clean Water Act. The groundwater picture is equally unsatisfying, and . . . is expected to get worse." *Id.*

21. Political scientist Anthony Downs speaks of a policy cycle in which "alarmed discovery and euphoric enthusiasm" is inevitably followed by the "recognition of costs" and a "decline in intense public interest." Anthony Downs, *Up and Down with Ecology: The Issue-Attention Cycle*, 28 PUB. INTEREST 39 (1972). The growing salience of costs was indicated by, among other things, President Reagan's requirement of cost-benefit analysis of environmental programs. See Exec. Order No. 12,291, 3 C.F.R. 127 (1981), reprinted in 5 U.S.C. § 601nt (Supp. 1989).

22. The basic technique multiplies the potency of a chemical or pollutant by the exposure to it of human and nonhuman populations. See John S. Applegate, *The Perils of Unreasonable Risk: Information, Regulatory Policy, and Toxic Substances Control*, 91 COLUM. L. REV. 261, 278 (1991). "More specifically, risk assessment is often described as a four-step process that (1) identifies hazards as causing in a qualitative sense some adverse health effects, (2) models the dose-response relationships to predict more firmly the degree of adverse effects at a given level of exposure, (3) estimates exposures, and (4) combines the foregoing into a predicted number or range of numbers of expected deaths or injuries." Hornstein, *supra* note 7, at 570 n. 30 (citing NATIONAL RESEARCH COUNCIL, RISK ASSESSMENT IN THE FEDERAL GOVERNMENT: MANAGING THE PROCESS 3 (1983)). This technique can be used to highlight marginal differences in dollars-spent-per-statistical-life saved across governmental health, safety, and environmental programs. See CASS R. SUNSTEIN, AFTER THE RIGHTS REVOLUTION 240-41 (1990) (describing as "seemingly irrational" comparative figures for expenditures per life saved under different programs).

respect quantitative risk assessment was earning as a scientific discipline²³ and by the federal government's experience with and capabilities for using risk assessments in regulatory standard-setting within many of its environmental programs.²⁴ Especially for those uncomfortable with the sometimes-frenetic political atmosphere in which environmental policies could be made, risk reduction promised to put policymaking on steadier footing.²⁵ The paradigm of risk reduction also offered reformers a conceptual vehicle to engraft a planning process which might integrate all-too-disparate regulatory programs.²⁶

Whatever the sources of its appeal, risk reduction quickly became a leading (if not *the* leading) paradigm for environmental law reform. On the basis of a 1990 report by its Science Advisory Board²⁷ (SAB) and an earlier report by senior agency administrators,²⁸ the Environmental Protection Agency (EPA or Agency) began to integrate the goal of risk reduction into the Agency's strategic planning and budgetary processes.²⁹ In 1991, both the Office of Management and Budget and the General Accounting Office endorsed greater emphasis on risk reduction in setting budget priorities for environmental

23. See Mary L. Lyndon, *Risk Assessment, Risk Communication and Legitimacy: An Introduction to the Symposium*, 14 COLUM. J. ENVTL. L. 289, 296 (1989) ("Scientists largely agree that [quantitative risk analysis] is science . . ."); Robert Cummings, *Is Risk Assessment a Science?*, 1 RISK ANALYSIS 1 (1981) ("[T]he field is jostling for recognition as a legitimate scientific discipline . . .").

24. See, e.g., Hornstein, *supra* note 7, at 565 ("For over a decade, EPA had elevated the concept of risk, and the quantitatively formal techniques of risk analysis, into increasingly important roles in the Agency's regulatory programs").

25. See *Reducing Risk, Setting Priorities and Strategies for Environmental Protection: Hearings on Recent Science Advisory Board Report Before the Senate Comm. on Environment and Public Works*, 102d Cong., 1st Sess. 48 (1991) [hereinafter *Reducing Risk*] (statement of William Reilly, Administrator, EPA) (EPA must ground itself on solid science rather than being "transported by middle-class enthusiasms").

26. See, e.g., John S. Applegate, *Worst Things First: Risk, Information, and Regulatory Structure in Toxic Substances Control*, 9 YALE J. ON REG. 277, 320, 346 (1992) (planning through priority setting addresses allocation of scarce resources, however planners might choose to define which risks are "worst").

27. RELATIVE RISK REDUCTION STRATEGIES COMM'N., SCIENCE ADVISORY BOARD, *REDUCING RISK: SETTING PRIORITIES AND STRATEGIES FOR ENVIRONMENTAL PROTECTION* (1990) [hereinafter EPA SCIENCE ADVISORY BOARD, *REDUCING RISK*].

28. U.S. ENVTL. PROTECTION AGENCY, *UNFINISHED BUSINESS: A COMPARATIVE ASSESSMENT OF ENVIRONMENTAL PROBLEMS* (1987) [hereinafter EPA's *UNFINISHED BUSINESS*].

29. In a 1990 memorandum, EPA Administrator William Reilly charged the Agency's regional and program offices to use risk reduction as the guiding light in fashioning their budgets: "To an unprecedented degree, your strategic plans use the risk reduction potential of EPA programs to organize activities and set priorities. . . . I expect to see evidence of this focus on risk reduction in your major budget decisions." Memorandum on Fiscal Year 1992 Budget Guidance from the Administrator of the EPA to Assistant Administrators, General Counsel, Inspector General, Regional Administrators, Associate Administrators 1, 3 (Apr. 26, 1990), quoted in David Clarke, *Chasing Rainbows: Is An Integrated Statute the Pot of Gold for Environmental Policy?*, 22 ENVTL. L. 280, 292-93 (1991). Even prior to official release of the SAB Report, Reilly had instructed EPA's program offices to develop four-year strategic plans oriented around the central goal of risk reduction. See Memorandum on EPA Strategic Planning and Budgeting from the Administrator of the EPA to Assistant Administrators, General Counsel, Inspector General, Associate Administrators, Regional Administrators 1, 2 (Mar. 27, 1989) ("in preparing plans, programs should address (and the Administrator will review) th[is] key issue[]: What areas of risk reduction can the program feasibly address . . ."), quoted in Clarke, *supra* at 290.

programs generally.³⁰ One observer of policymaking at EPA has called the new emphasis on risk reduction a "quiet revolution."³¹ A senior EPA administrator concluded in 1991, "[i]ncreasingly, the environmental agenda is being shaped around a cost-benefit, risk-reduction paradigm, with potentially profound legal, economic, budgetary, policy, and ultimately environmental implications."³² In this context, accordingly, there was nothing anomalous when arguments in favor of strictly enforcing the Delaney Clause in 1992 were met with a firestorm of criticism that modern risk assessment techniques allowed scientists to make far more discriminating judgments about the risks posed by carcinogenic pesticide residues than Delaney's blanket prohibition.

Risk reduction, of course, is not without its problems. EPA's Science Advisory Board acknowledged that the information base on which risk assessments are made is often "woefully" inadequate,³³ and work in the economics of information suggests that we *cannot* expect either unbiased information or enough information until we get much closer to designing incentive systems which address the "public goods" nature of health and safety data.³⁴ Estimates of risk, moreover, often emphasize the overall incidence of death or injury (by which criterion, for example, the risks of hazardous waste sites may be reasonable when compared with other risks) and not other attributes of risk such as its equitable distribution (by which criterion the unequal distribution of hazardous waste risks between caucasians and people of color may be shameful).³⁵ More generally, it has long been argued that the measurement of risk cannot be separated from value judgments in risk assessment

30. "In February 1991 . . . OMB proposed a 'risk reduction pilot project' to determine spending priorities among environmental programs within the Departments of Defense and Energy for fiscal year 1992." Hornstein, *supra* note 7, at 563-64. In testimony before the Senate Environment and Public Works Committee, one of GAO's environmental program officers also endorsed the use of "relative risks" to "better enable the nation to achieve environmental goals with limited resources." U.S. GENERAL ACCOUNTING OFFICE, OBSERVATIONS ON THE ENVIRONMENTAL PROTECTION AGENCY'S BUDGET REQUEST FOR FISCAL YEAR 1992, 2 (1991) (statement of Richard L. Hembra, Director Environmental Protection Issues Resources, Community, and Economic Development Division, before the Senate Committee on Environment and Public Works, 102d Congress, 1st Session (1991)).

31. Leslie Roberts, *Counting on Science at EPA*, 249 SCI. 616, 616 (1990).

32. John Atcheson, *The Department of Risk Reduction or Risky Business*, 21 ENVTL. L. 1375, 1376 (1991). (Mr. Atcheson is chief of EPA's Prevention Integration Branch).

33. See Hornstein, *supra* note 7, at n.227, citing EPA SCIENCE ADVISORY BOARD, REDUCING RISK, *supra* note 27, at app. B., 2 (SAB criticized incompleteness of risk data used in EPA's UNFINISHED BUSINESS report as making the resultant risk assessments "tenuous"); see also Hornstein, *supra* note 7 at n.227, citing EPA's UNFINISHED BUSINESS, *supra* note 28, at 14 (UNFINISHED BUSINESS authors themselves admitted that underlying risk data or assessment methodologies were "weak," "poor," "incomplete," or nonexistent).

34. See *infra* notes 248-49 (sources describing that, because information is a "public good" that cannot easily be controlled for profit by its producer, there are no market incentives in the private sector to produce good information).

35. See Richard J. Lazarus, *Pursuing "Environmental Justice": The Distributional Effects of Environmental Protection* 22 (Working Paper Series No. 92-7-1, Washington University School of Law, July 7, 1992) (forthcoming in NW. U. L. REV.) (recounting study by United Church of Christ Commission for Racial Justice showing disproportionately high likelihood of siting a hazardous or solid waste facility in a minority neighborhood).

methodologies; to the extent this is true, risk assessments can reflect merely the nonscientific and idiosyncratic values of the assessors rather than scientific conclusions.³⁶

Criticisms such as these, however, seem to have only slightly diminished the enthusiasm for risk-based reform. In its transition report to the Clinton Administration, the General Accounting Office recommended that EPA base its program priorities "on actual risk to public health and the environment . . . [which] should be determined by science, not by public perceptions."³⁷ One of the first environmental bills introduced in the 103rd Congress was a proposal by Senator Daniel Moynihan to make comparative risk assessments a major consideration for government-wide environmental policymaking.³⁸ Prior to the 1992 presidential election, President Bush had reportedly considered an executive order "that would establish uniform principles of risk assessment and management throughout EPA and possibly throughout the entire federal government."³⁹ Several reform proposals introduced in both the 102nd and 103rd Congresses have urged the use of "acceptable cancer risks" based on risk assessments as regulatory screening devices.⁴⁰

36. The most notorious illustration involves two risk assessments of the same chemical. These efforts which differ only in the assessors' choice between plausible models for extrapolating information from animal bioassays produce risk estimates which differ by a *millionfold*—a level of indefiniteness akin to "not knowing whether you have enough money to buy a cup of coffee or pay off the national debt." Carl F. Cranor, *Scientific Conventions, Ethics and Legal Institutions*, 1 RISK: ISSUES IN HEALTH & SAFETY 155, 157 (1990) (citing Seth Cothorn et al., *Estimating Risks to Health*, 20 ENVTL. SCI. & TECH. 111 (1986)).

Perhaps for reasons such as these, EPA has acknowledged that comparing risks, especially, involves inescapable political questions and has encouraged states and localities to fashion regional risk-reduction strategies through relatively open, "town-meeting"-type planning processes. See generally OFFICE OF POLICY, PLANNING, AND EVALUATION, U.S. E.P.A., AN OVERVIEW OF RISK-BASED PRIORITY SETTING AT EPA (1992) (draft prepared for the Center for Risk Management, Resources for the Future) (copy on file with author) (describing Agency's grant program to promote priority-setting planning processes at the state and local level); COMPARATIVE RISK BULLETIN 16, at 4-6 (Sept. 1992) (describing status of state and local comparative risk projects).

Currently, it is unclear how these "softer" versions of risk reduction might interrelate with "harder" versions of risk-based priority-setting; nor is it clear how town-meeting-style approaches might handle the problem of preference "cycling" that economist Kenneth Arrow predicted from such relatively unstructured democratic institutions or the problem of policy outcomes skewed by the undue influence of local special interests predicted by Mancur Olson's "logic of collective action."

37. See *General Policy: Changes in Policy, Management Practices Recommended at EPA* by GAO Transition Report, 23 Env't Rep. (BNA) No. 38, at 2356 (Jan. 15, 1993); cf. *id.* (also encouraging the use of incentive-based environmental regulation, including incentives to encourage environmentally responsible agricultural practices).

38. See S. 110, 103d Cong., 1st Sess. (1993); see also S. 2132, 102d Cong., 2d Sess. (1991) (related bill introduced by Senator Moynihan in 102nd Congress).

39. See Alan Rosenthal et al., *Legislating Acceptable Cancer Risk from Exposure to Toxic Chemicals*, 19 ECOLOGY L. Q. 269, 358-59 (1992). In the spirit of risk reduction, former EPA Deputy Administrator Henry Habicht chaired an interagency committee on risk assessment which tried to harmonize risk assessment practices throughout the executive branch. See *id.* at 358. Among other things, the committee is "developing assessment guidelines for cancer risks and for such noncancer risks as neurotoxicity, developmental effects, and reproductive effects." *Id.*

40. The leading example in the 103rd Congress is, of course, legislation introduced to replace the Delaney Clause. See S. 331, 103d Cong., 1st Sess. (1993); H.R. 872, 103d Cong., 1st Sess. (1993); H.R. 1627, 103d Cong., 1st Sess. (1993). Two proposals introduced in the 102nd Congress would have

Among academicians, Professor John Applegate appreciates many of the limitations of risk reduction but nonetheless leans toward effects-based planning mechanisms "to confront directly the need for allocation and priority setting across the various areas of EPA's responsibility."⁴¹ Less cautiously, analyst Peter Huber argues that only "an aggressive calculus of risk created and risk averted" can provide a "progressive transformation of the risk environment."⁴² And Professor Richard Stewart endorses risk-oriented reform when he speaks of ranking environmental problems followed by the progressive reduction of overall risk in the country's risk "portfolio."⁴³ Although it is unclear whether any such centralized and comprehensive regulatory regimes might soon be adopted, they all reflect the gravitational pull of risk-oriented reform.

B. Cause-Oriented Reform: Prospects and Problems

As a general matter, cause-oriented reforms focus on reducing human pressures on natural resources, often by encouraging "clean" technologies or changes in consumption and use patterns. Roughly speaking, this approach contrasts with the focus of risk-based reforms on managing environmental effects to some level of acceptable risk.⁴⁴ For all the attention given risk-based reform, cause-oriented approaches to policymaking may actually pack as much force in explaining many recent changes in environmental law. For example, there has been an increased tendency to build environmental protection directly into statutory programs governing production processes in transportation, energy, and agriculture, without any attempt to justify the programs in risk-reduction terms.⁴⁵ Thus, the Intermodal Surface

incorporated a one-in-one-million threshold into different provisions of the Clean Air Act and Clean Water Act. See S. 1074, 102d Cong., 1st Sess. (1991) & H.R. 2342, 102d Cong., 1st Sess. (1991) (amending the Federal Food Drug and Cosmetic Act); H.R. 2084, 102d Cong., 1st Sess. (1991) (amending the Clean Water Act). As it is, informal bright line distinctions may be drawn by states in developing "acceptable risk levels" for carcinogens in surface waters under the Clean Water Act. See Rosenthal et al., *supra* note 39, at 358. Section 112 of the Clean Air Act already establishes one of the few "bright lines" drawing a risk threshold for further regulatory action. See 42 U.S.C. §7412(c)(9)(B)(i), (f)(2)(A) (Supp. 1990).

41. Applegate, *supra* note 26, at 352.

42. Peter W. Huber, *Safety and the Second Best: The Hazards of Public Risk Management in the Courts*, 85 COLUM. L. REV. 277, 278, 335 (1985).

43. Richard B. Stewart, *The Role of the Courts in Risk Management*, 16 Envtl. L. Rep. (Envtl. L. Inst.) 10,208 (1986).

44. It is certainly not impossible, however, for risk-oriented reforms to be used in pollution prevention efforts. See, e.g., *infra* note 57 (discussing EPA's 33/50 program, which relies on risk assessments to identify high-risk chemicals but then encourages source reductions that are not finely calibrated with formal risk-reduction methodologies).

45. Indeed, changes in statutory programs are often made despite risk-based objections. See, e.g., HERBERT INHABER, *ENERGY RISK ASSESSMENT* 5, 42-43 (1982) ("the risk from nonconventional energy sources can be as high as, or even higher than, that of some conventional sources"); CY A. ADLER, *ECOLOGICAL FANTASIES* 89-90 (1973) (criticizing link between mass transit and cleaner air in New York City); STEVEN J. TAFF, *SUSTAINABLE AGRICULTURE: POLICY REFORM IS NOT ENOUGH* 1 (Staff Paper P90-34, Staff Paper Series, University of Minnesota Department on Agricultural & Applied Economics, 1990)

Transportation Efficiency Act of 1991⁴⁶ establishes programs for mass transit and transportation planning to address the "underlying causes" of many environmental problems.⁴⁷ The 1992 National Energy Policy Act⁴⁸ creates programs to foster energy conservation and includes tax benefits to promote renewable energy sources, with explicit congressional references to addressing the "underlying causes" of pollution problems.⁴⁹ The 1985 and 1990 Farm Bills⁵⁰ both contain provisions designed to encourage "alternative" agricultural production techniques in the name of their environmental benefits.⁵¹

Cause-oriented reforms also seem better able to explain recent legislative and regulatory efforts toward pollution prevention and source reduction. These

(policy reform for sustainable agriculture can be oversold); Leonard P. Gianessi, *Alternative Agriculture: Insights into the Benefits of Agrichemicals I* (1989) (paper presented at the 1989 Fall Conference of the National Agricultural Chemicals Association) (copy on file with author) ("close examination of the data and case studies in [the NAS Report supporting "alternative" agriculture] makes it unclear how [the NAS'] conclusion was arrived at. The case studies, in particular, support almost the exact opposite conclusion").

46. Intermodal Surface Transportation Efficiency Act of 1991, Pub. L. No. 102-240, 105 Stat. 1914 (codified in part in scattered sections of 23 U.S.C. (Supp. 1991)).

47. See H.R. Rep. No. 102-171, 102d Cong., 2d Sess. 5 (1991) (the Act encourages states "to develop the best [transit] solutions from the standpoint of national productivity, cleaner air, and energy efficiency"); *id.* at 14 ("intermodal planning" should be conducted in concert with planning for cleaner air [and] congestion management). See also *Hearings on National Mass Transit Reauthorization, Before the Subcomm. on Housing and Urban Affairs*, 102d Cong., 1st Sess. 2 (1991) (statement of Sen. Cranston) ("[T]he need for mass transit is greatly heightened by increasing air pollution"); *Hearings on Oversight of the Federal Aid Highway Program, Part III, Before the Subcomm. on Water Resources, Transportation and Infrastructures of the U.S. Senate Comm. on Environment and Public Works*, 101st Cong., 2d Sess. 6 (1990) (statement of Sen. Robert Graham) ("One of the key strategies for obtaining clean air standards is by providing alternatives for the use of the private passenger vehicle, particularly automobiles Mass transportation programs can play an influential role in helping . . . attain these higher air quality standards").

48. Comprehensive National Energy Policy Act of 1992, Pub. L. No. 102-486, 106 Stat. 2776 (1992) (codified in part in scattered sections of 42 U.S.C.A. (1993)).

49. See 42 U.S.C.A. § 13401 (1993) ("It is the goal of the United States in carrying out energy supply and energy conservation research and development . . . (3) . . . to [develop] an environmentally sustainable energy system; . . ."); *id.* § 13457 (" . . . The Secretary . . . is authorized to continue to carry out a . . . program to improve the energy efficiency and cost effectiveness of pollution prevention technologies and processes, including source reduction and waste minimization technologies and processes. The purposes of this section shall be to—(1) apply a systems approach to minimizing adverse environmental effects of industrial production . . . ; and (2) incorporate consideration of the entire materials and energy cycle with the goal of minimizing adverse environmental impacts."); *id.* § 13316 (development of a renewable energy technology transfer program to encourage renewable and sustainable development in the United States and abroad).

50. Food Security Act of 1985, Pub. L. No. 99-198, 99 Stat. 1354 (codified in part in scattered sections of 7, 16, 12, and 15 U.S.C. (1986)); Food, Agriculture, Conservation and Trade Act of 1990, Pub. L. No. 101-624, 104 Stat. 3359 (1990) (codified in part in scattered sections of 7, 16, 12, and 15 U.S.C. (Supp. 1991)).

51. The major provisions of the 1985 Farm Bill deny federal subsidies, loans, or credits to farming operations that destroy wetlands or produce crops on highly erodible land. See 16 U.S.C.A. § 3811 (1993). The 1990 Farm Bill places a greater emphasis than any earlier farm legislation on reducing agricultural runoff and nonpoint source pollution of surface water. See 16 U.S.C.A. §§ 3838-3838(f) (1993). See generally John E. Ikerd, *Environmental Issues in the 1990 Farm Bill Debate*, 1990 J. AGRIBUSINESS 5 (Spring 1990); John A. Davidson, *Environmental Analysis of the Federal Farm Programs*, 8 VA. ENVTL. L.J. 235 (1989); Linda A. Malone, *Conservation at the Crossroads: Reauthorization of the 1985 Farm Bill Conservation Provisions*, 8 VA. ENVTL. L.J. 215 (1989).

efforts seek to shift policy away from the current regulatory emphasis on "pollution control," which often imposes relatively expensive after-the-fact cleanup requirements, toward more direct incentives for less polluting production processes or product design.⁵² Although risk-reduction rationales are sometimes articulated for these new incentives,⁵³ as often the new measures are the subject of skepticism by those wedded to the risk-reduction paradigm.⁵⁴ For this reason, such measures as solid-waste recycling or packaging requirements,⁵⁵ which have proliferated explosively at the state and local level over the past five years,⁵⁶ seem more likely to reflect the influence of cause-oriented policymaking. So too, programs designed expressly to eliminate toxic chemicals in industrial⁵⁷ and agricultural⁵⁸ processes, without

52. See Stephan M. Johnson, *From Reaction to Proaction: The 1990 Pollution Prevention Act*, 17 COLUM. J. ENVTL. L. 153, 155 (1992) ("Legislation and regulations encourage firms to invest hundreds of millions of dollars in pollution control technologies rather than to explore improvements in feedstocks or production methods, plant maintenance, or other pollution prevention techniques that would cost less to implement and would achieve higher levels of environmental protection"); see also Krier, *supra* note 20, at 24 ("[w]hereas the first round of devices had cut by ninety percent whatever was being emitted, and whereas the second round cuts the remainder by ninety percent again . . . the costs of this [second] modest gain exactly equals that of the far greater gains accomplished the first time around. This explains why the marginal costs of more stringent pollution controls typically escalate so rapidly").

53. See *Reducing Risk*, *supra* note 25, at 22, 25 (arguing for both pollution-prevention and sustainability-based techniques within the framework of a comparative risk regime).

54. See, e.g., Lynn Scarlett, *Five Green Myths*, THE STRAITS TIMES, Aug. 13, 1992, at 5 (some recycling programs use large amounts of energy and produce high volumes of water waste).

55. Such programs include voluntary and mandatory curbside pick-up of recyclable materials, as well as the creation of drop-off locations for recyclables. See David H. Folz, *Recycling Program Design, Management, and Participation: A National Survey of Municipal Experience*, 51 PUB. ADMIN. REV. 222, 223 (1991). Beverage container ("bottle bill") legislation is another such program. See Anthony T. Drollas, Jr., Note, *The New Jersey Statewide Mandatory Source Separation and Recycling Act: The Nation's First Comprehensive Statewide Mandatory Recycling Program*, 12 SETON HALL LEGIS. J. 271, 278 (1989).

56. At least six states have enacted mandatory statewide recycling requirements, and twenty-three states have legislation or executive orders establishing a preference in state procurement practices for items made from recycled materials. See, e.g., Act Approved July 2, 1987, 1987 Conn. Acts 544 (Reg. Sess.) (codified as amended at CONN. GEN. STAT. ANN. §§ 22a-241 to 22a-241b, §§ 22a-241e to 22a-241g (West Supp. 1993)) (mandatory statewide recycling); Act Approved June 24, 1988, 1988 Fla. Laws ch. 130 (codified at FLA. STAT. ANN. §403.702 (West Supp. 1993)) (mandatory statewide recycling); Act Approved May 27, 1988, 1988 Md. Laws 536 (codified as amended at MD. ENVIR. CODE ANN. §§ 9-1701 to 9-1706) (Supp. 1992)) (mandatory statewide recycling); 1988 Alaska Sess. Laws 63 (codified at ALASKA STAT. § 29.71.050 (1992)) and 1990 Alaska Sess. Laws 175 (codified at ALASKA STAT. § 36.30.339 (1992)) (procurement preference for recyclables); 1989 Cal. Stat. 1094 (codified at CAL. PUB. CONT. CODE §§ 12150 to 12163, §§ 12300 to 12310 (West Supp. 1993)) (procurement preference for recyclables); 1988 Mich. Exec. Order 2 (procurement preference for recyclables). See generally William L. Kovacs, *The Coming Era of Conservation and Industrial Utilization of Recyclable Materials*, 15 ECOLOGY L.Q. 537 (1988) (describing state and local programs).

57. In February 1991, EPA launched its "33/50" program, designed to encourage industry to reduce voluntarily toxic pollutants at the source. See *205 Firms Sign up for Industrial Toxics Project; EPA Aims for 50% Cut in Releases by 1995*, 15 Chem. Reg. Rep. (BNA) No. 8, at 262 (May 24, 1991). The object of the plan is to reduce 33% of the output of the 17 most high-risk toxic pollutants by 1992, and to reduce output by 50% by 1995. *Id.* Although the initial designation of the toxic chemicals is based on risk analysis, the actual reductions are based on source limitation and pollution control possibilities. See *Reilly's Corporate Volunteerism Campaign Marred by Skepticism*, 22 Env't Rep. (BNA) at 2682 (Apr. 3, 1992). As a general matter, the Pollution Prevention Act of 1990, 42 U.S.C. §§ 13101-13109 (Supp. 1990), encourages as a matter of policy the control of toxic chemicals and emissions through source reduction techniques. The Act seeks to encourage, among other approaches, equipment and technology modification,

obsessive reliance on risk assessments to parse the contours of these programs,⁵⁹ seem best described as cause-oriented reforms. The increasing willingness to rely on zoning and other forms of land-use planning to effectuate environmental policy⁶⁰ also fits better into a cause-based, rather than risk-based, approach to reform.⁶¹

reformulation and redesign of products, substitution of raw materials, and improvement in management, inventory control, or other general operational phases of industrial facilities. *Id.* § 13106(b)(3).

58. In 1989, the Agricultural Stabilization and Conservation Service established an Integrated Crop Management Program to "encourage the adoption of farm management systems that incorporate the use of integrated pest management and nutrient management practices." REPORT OF THE POLICY CONSTRAINTS RESOLUTION TEAM, NATIONAL INTEGRATED PEST MANAGEMENT FORUM, INTEGRATED PEST MANAGEMENT: FEDERAL POLICY CONSTRAINTS OPTIONS FOR CHANGE 32 (June 1992) [hereinafter POLICY CONSTRAINTS RESOLUTION TEAM] (unpublished report on file with author). In the 1990 Farm Bill, Congress authorized an Integrated Farm Management Program to reduce the disincentives to low-input farm management systems that may be caused by the commodity support programs of the U.S. Department of Agriculture. *Id.* at 33. See *infra* note 166 (discussing these efforts).

59. See note 57 *supra* (risk assessments are used to select which chemicals to target but not to define with precision how much risk from these chemicals is "acceptable").

60. The link between land-use control and environmental protection, although plain in theory, has often been resisted politically for fear of developing national land-use planning. Perhaps the most vivid example of this resistance is the reaction to EPA's proposed "indirect source" regulation under the Clean Air Act, 38 Fed. Reg. 29,893 (1973) (proposed amendment at 40 C.F.R. pt. 52), which would have required the regulation of such indirect sources of air pollution as parking decks that attract large numbers of drivers. The reaction to this attempt at transportation planning was "overwhelmingly critical." R. SHEP MELNICK, REGULATION AND THE COURTS: THE CASE OF THE CLEAN AIR ACT 309 (1983), and Congress in 1977 prohibited EPA from requiring such regulation, see 42 U.S.C. § 7401(a)(5)(A)(i)-(ii) (1988). See generally Patrick Del Duca & Daniel Mansueto, *Indirect Source Controls: An Intersection of Air Quality Management and Land Use Regulation*, 24 LOYOLA L.A. L. REV. 1131 (1991). To appreciate how attitudes toward such planning efforts may be changing, however, it is useful to recognize that Congress in 1991 encouraged transportation planning in the Intermodal Surface Transportation Efficiency Act, see *supra* notes 46-47 and accompanying text. For an analysis of the relationship between environmental protection and land-use, see Linda A. Malone, *The Necessary Interrelationship Between Land Use and Preservation of Groundwater Resources*, 9 UCLA J. ENVT'L. L. & POL'Y 1 (1990).

61. One of the best illustrations of this may be drinking water protection. The dominant federal program is the Safe Drinking Water Act, 42 U.S.C. §§ 300f-300j-26 (1986). The Safe Drinking Water Act establishes "national primary drinking water regulations" by requiring EPA to specify "maximum contaminant levels" for contaminants (listed on the basis of risk assessments) and then specifying recommended treatment techniques (developed on the basis of available technology). See generally Kenneth F. Gray, *The Safe Drinking Water Act Amendments of 1986: Now a Tougher Act to Follow*, 16 Envtl. L. Rep. (Envtl. L. Inst.) 10338 (1986). In contrast to this mix of risk-based and technology-based standards, seventeen states have adopted watershed protection plans that depend far more on land-use restrictions to minimize the underlying causes of drinking water pollution. See R.I. GEN. LAWS § 42-17.1-2(d) (Supp. 1992) (setting up planning branch in department of environment to review and approve legislatively mandated watershed protection plans); N.C. GEN. STAT. § 143-214.5 (1992) (mandatory watershed protection plans); CONN. GEN. STAT. ANN. § 7-1311, § 22a-319 (West 1985) (authorizing watershed protection projects); IOWA CODE ANN. § 161A.7 (West Supp. 1993) (authorizing watershed protection "operations"); MD. CODE ANN. art. 25, § 184 (1990) (authorizing public watershed associations to carry out works of improvement and to develop "plans" for watershed protection); MO. ANN. STAT. § 278.160 (Vernon 1993) (authorization for soil and water districts to carry out watershed protection "programs"); NEB. REV. STAT. § 23-320.01 (1991) (authorizing counties to construct "works" for watershed protection); N.D. CENT. CODE. § 61-16.1-01 to 61-16.1-63 (1985 & Supp. 1991) (authorizing watershed protection "districts"); 32 PA. CONS. STAT. § 818 (1967) (authorizing interstate compact with Delaware for purposes of watershed protection); S.C. CODE ANN. § 48-17-10 (Law. Co-op. 1987) (creating Authority to institute and operate "programs of watershed protection"); TEX. AGRIC. CODE ANN. § 201.024 (West 1982) (authorizing contracts for "state-approved watershed protection plans"); WASH. REV. CODE ANN. § 43-27A.090 (West Supp. 1993) (authority to "assemble plans for watershed protection"); GA. CODE ANN. § 12-2-8(d) (1992) (authorizing "procedures" for watershed protection planning); MINN. STAT. ANN. § 103C.331, sub. 12(a) (West Supp.

Cause-oriented reform, like risk-based reform, also has its problems. Apart from the difficulties of deciding when the search for cause has gone too far or not far enough,⁶² cause-oriented reform might discourage human activity that "causes" significant social benefits as well as environmental harm.⁶³ Moreover, the uneven loss of benefits among different classes of citizens, no less than the uneven distribution of risks, is capable of adversely affecting our collective preferences for equity (such as when factories lay-off disproportionately high numbers of low-income workers and replace them with "clean" technologies).⁶⁴ Further, without some way to measure comparative environmental effects, cause-oriented reforms might pick clean technologies that turn out in fact to be worse environmentally than the technologies they supplant.⁶⁵ Finally, a "pure" cause-based regime that does not make any attempt to measure risk scientifically seems dangerously manipulable; as cultural anthropologists remind us, no one in 15th Century Europe cared much about waterborne diseases from public water supplies until it was suggested to have been "caused" by the Jews.⁶⁶

Criticisms such as these provoke responses from cause-oriented reformers that theirs is not a system without a role for scientific inquiry and investigation, but only a system that employs scientific analysis within the

1993) (authorizing soil and water conservation districts to administer watershed protection "projects"); IDAHO CODE § 42-3601 (1990) (acknowledging desirability of watershed protection).

62. In an essay forthcoming in *Environmental Science and Technology*, policy analyst Adam Finkel contrasts risk-oriented and (what I term) cause-oriented approaches with the metaphor of a physician who uses risk assessment techniques to diagnose symptoms in a patient such as stressed joints, high blood pressure, and narrowing arteries and then to prioritize a course of treatment such as ibuprofen, diuretics, coronary angioplasty, and so on. "But for this hypothetical patient," Finkel observes, "the problem isn't a constellation of circulatory and skeletomuscular symptoms—it's being overweight—and the priority for treatment might well be . . . exercise and diet rather than a menu of 'risk reductions' involving drugs and surgery." See Adam Finkel, *Into the Frying Pan*, ENVTL. SCI. & TECH. (forthcoming 1993) (copy on file with author). Although the point of Finkel's insightful metaphor is to highlight the importance of "cause," it also highlights how difficult reliance on "cause" can be. To keep with Finkel's example, what if the overweight patient is overweight precisely because she cannot rely on her own sense of self and self-discipline to exercise or diet (not a particularly hypothetical set of circumstances). In such a case, the best (or is it second best?) course of treatment might well be to ignore underlying causes and focus on the pharmaceuticals and surgery.

63. Professor Christopher Schroeder uses the insecticide DDT as an example and argues that, "[t]o ban its production or use . . . ignores the individual claim of potential malaria victims to have *their* bodily integrity respected . . . [an argument that injury from DDT residue is wrong] because caused by human agency [rather than "naturally occurring" malaria] seems to put far too much weight on the distinction between actions and nonactions." Christopher H. Schroeder, *Rights Against Risk*, 86 COLUM. L. REV. 495, 517-18 (1986) (emphasis in original).

64. See Albert L. Nichols, *Risk-Based Priorities and Environmental Justice* 7 (paper presented to the Resources for the Future Conference on Setting Environmental Priorities, Nov. 16, 1992) (air quality management plan for southern California would put low-income workers most at risk of employment losses as pollution-intensive industries shut down their operations in response to higher control costs).

65. A commonly cited example is the fumigant EDB, which was replaced by a fumigant said to present even greater risks to grain milling workers. See William R. Havender, *EDB and the Marigold Option*, 1984 REG. 13, 16 (Jan.-Feb. 1984).

66. See MARY DOUGLAS & AARON WILDAVSKY, *RISK AND CULTURE: AN ESSAY ON THE SELECTION OF TECHNICAL ENVIRONMENTAL DANGERS* 7 (1982).

larger project of internalizing environmental externalities. In contrast to risk-reduction's outermost hope for a system of triage within a national risk "portfolio,"⁶⁷ cause-oriented reformers urge the need for the responsible integration of public health and environmental concerns into our definition of social progress. Ambitious reformers propose the replacement of current measurements of gross domestic production with an index of "sustainable" economic indicators,⁶⁸ and the creation of mechanisms that can integrate environmental costs into the price structure of goods and services.⁶⁹ Proposals for more centralized and bureaucratic reforms can also be found, including those that would establish population controls⁷⁰ and national (or even international) land-use planning in an effort to conform the levels and distribution of human resource consumption to the "carrying capacities" of various ecosystems.⁷¹ Although proposals such as these are no more likely to be adopted soon than are national risk "portfolios," they all reflect the distinct gravitational pull of the cause-oriented paradigm.

C. Policymaking Paradigms and the Case for "Probing" in Environmental Law Reform

This Article makes the case for deliberate and careful experimentation in the near term with cause-oriented reforms without either jettisoning too soon existing regulatory structures or abandoning appropriate insights from quantitative risk assessments. Such a deliberate strategy of "probing"⁷² for measures that might ameliorate the underlying causes of environmental problems, despite the caution I believe is required in the undertaking, would represent a watershed in the development of environmental law. It would constitute a strategy best capable of experimenting with incentive-based rather than command-and-control regulation, best able to achieve a new round of

67. See Stewart, *supra* note 43.

68. See, e.g., HERMAN E. DALY & JOHN B. COBB, JR., FOR THE COMMON GOOD 401-55 (1989); ROBERT REPETTO ET AL., WASTING RESOURCES: NATURAL RESOURCES IN THE NATIONAL INCOME ACCOUNTS 8 (1989); ALBERT GORE, JR., EARTH IN THE BALANCE 182-91 (1992).

69. See, e.g., JUSTIN WARD ET AL., REAPING THE REVENUE CODE 56-57 (1989) (discussing benefits of a modest excise tax on pesticides); Christopher Flavin, *Creating a Sustainable Energy Future*, in STATE OF THE WORLD 22, 26-27 (Linda Starke ed. 1988) ("Energy prices are the key to a rational energy system One means of ensuring that cheap imported oil does not undermine alternative energy investments is to tax oil or oil products").

70. See, e.g., PAUL R. EHRLICH & ANNE H. EHRLICH, HEALING THE PLANET 241 (1991) ("Controlling population growth is critical. . . . Because of the built-in time lags, unless the surge in human numbers is halted soon and a gradual population *shrinkage* begun, there is no hope of solving [environmental] problems") (emphasis in original).

71. See generally ANNE MATTHEWS, WHERE THE BUFFALO ROAM (1992) (discussing controversial and widely discussed proposal by Rutgers Professors Frank and Deborah Popper to "zone" a "buffalo commons" out of 139,000 square miles of the Great Plains in ten states).

72. The term "probing" is taken from CHARLES E. LINDBLOM, INQUIRY AND CHANGE: THE TROUBLED ATTEMPT TO UNDERSTAND AND SHAPE SOCIETY 29 (1990).

environmental gains, and most likely to accommodate in a workable fashion the uncertainties and diverse values in environmental policymaking.

To put cause-oriented probing in perspective, it is useful to recall the description offered by Dean Colin Diver over a decade ago of two basic decisionmaking paradigms.⁷³ One of these paradigms, Diver observed, is "comprehensive rationality"—a four-step process in which goals are specified, all possible methods for achieving goals are identified, the effectiveness of each method is evaluated, and alternatives chosen that represent the greatest progress toward desired goals.⁷⁴ The other is "incrementalism"—a less synoptic process in which "lofty visions of some preferred social state play no role," small changes are adopted in response to errors, only a handful of alternatives are identified and compared, and decisionmaking is decentralized throughout many levels of government and in society at large.⁷⁵ Diver argued that comprehensive rationality had "triumphed" as the modern decisionmaking paradigm,⁷⁶ and noted how it was often seen as especially well suited to environmental policymaking.⁷⁷

Today's risk-oriented reformers argue that environmental policymaking needs to be even more comprehensive. With an eye to fully integrated environmental management, these reformers argue that only a single interrelated risk-reduction system can prevent cross-media pollution, assure that regulatory action against toxic substances does not lead to even worse substitutes, and coordinate trade-offs among disparate programs to optimize overall compliance expenditures.⁷⁸ In their quest for synoptic rationality, risk-oriented reformers argue for regulatory comparisons that measure carcinogenic, neurotoxic, mutagenic, teratogenic, and ecological risk⁷⁹ and even more demanding algorithms that factor in the health risks of low income and unemployment.⁸⁰ Although Professor James Krier has observed that truly comprehensive risk analysis would require an "everything" model,⁸¹ many risk-oriented reformers seem to take this as a challenge rather than as fundamental criticism.

73. See Colin S. Diver, *Policymaking Paradigms in Administrative Law*, 95 HARV. L. REV. 393 (1981).

74. *Id.* at 396.

75. *Id.* at 399.

76. *Id.* at 409-21.

77. See *id.* at 415 (use of comprehensive rationality in Toxic Substances Control Act), 416-17 (use of comprehensive rationality in National Forest Management Act and National Environmental Policy Act), 422-28 (speculating on Supreme Court's support for comprehensive rationality and distrust of public participation).

78. See Hornstein, *supra* note 7, at 580-84 (speaking of the "allure" of synopticism).

79. *Id.* at 574-78.

80. See OMB Criticizes OSHA Health Regulation, *Resurrects Issue of Risk-Risk Analysis*, 16 Chem. Reg. Rep. (BNA) No. 27, at 1199 (Oct. 2, 1992) (OMB believes that any unintended health effects caused by lower wages or unemployment brought about by industry compliance costs with environmental regulations must be considered in determining the cost-benefit rationality of health and safety measures).

81. James E. Krier & Mark Brownstein, *On Integrated Pollution Control*, 22 ENVTL. L. 119, 126-27 (1991).

Yet this quest for super synopticism in environmental law arises at a time when enthusiasm generally for the paradigm of comprehensive rationality has tempered. An impressive body of literature has documented how synoptic ideals can impose informational and analytical burdens that make effective governmental intervention impossible, even if goals can be specified and agreed upon.⁸² Indeed, administrative law scholars increasingly are arguing that the success of informal rulemaking as a social mechanism may depend on it being “de-ossified” from overly analytical straightjackets.⁸³ Even more fundamentally, a large body of literature has documented the normative difficulties in accurately discovering “preferences” for environmental protection on which the whole synoptic enterprise depends,⁸⁴ because public preferences themselves will adapt to the creativity and range of possible societal arrangements (or lack thereof).⁸⁵ Forcing the electorate to prioritize its multiple concerns about environmental protection and then to trade off “environmental” preferences against each other and against “economic” preferences (say, for jobs or “competitiveness”) altogether misses the point of perhaps the most commonly expressed preference: for environmentally sustainable economic policies that minimize the need for trade-offs. It is no answer to argue that *some* trading off is inevitable in this life (a truism which merely restates the economic concept of opportunity costs). The fundamental policy debate is about how society might better organize itself through legal rules and public policies to avoid *unnecessary* trade-offs among deeply held public values.

There are reasons to believe that cause-oriented reform, if properly approached, can make progress toward sustainability where more synoptic risk-based reform cannot. Identifying the reasonably proximate causes of environmental problems (the qualifier “reasonably proximate” is important),⁸⁶ will in many instances require far less information than developing full-fledged

82. See, e.g., JERRY L. MASHAW & DAVID L. HARFST, *THE STRUGGLE FOR AUTO SAFETY* 164 (1990) (“[t]he bureaucratic aspiration to comprehensive rationality is tempered both in doctrinal announcement and in practice by some appreciation of reality”); Thomas O. McGarity, *Some Thoughts on “Deossifying” the Rulemaking Process*, 1992 DUKE L.J. 1385, 1400-10 (1992) (hurdles created for informal rulemaking by substantive requirements for comprehensive rationality).

83. See McGarity, *supra* note 82, at 1385-86 (referring to former EPA General Counsel and current Yale Law School professor Donald Elliott as coining the phrase “ossification of rulemaking”).

84. See, e.g., LINDBLOM, *supra* note 72, at 18-21; Hornstein, *supra* note 7, at 618, n. 256; Cass R. Sunstein, *Legal Interferences With Private Preferences*, 53 U. CHI. L. REV. 1129 (1986).

85. See, e.g., LINDBLOM, *supra* note 72, at 21-22; Hornstein, *supra* note 7, at 620-21; Cass R. Sunstein, *Administrative Substance*, 1991 DUKE L.J. 607, 620-21.

86. Of course, I am mindful that there are “ultimate” causes of environmental degradation (including perhaps psychological, anthropological, or religious causes), and so I use designedly the qualifier “proximate.” And, to avoid the possibility of socially constructed but scientifically imaginary causes, I designedly use the full term “reasonably proximate,” which accepts the need for some degree of scientific link between cause and effect but without necessarily requiring something on the order of a fully developed dose-response curve.

dose-response relationships to pinpoint environmental effects.⁸⁷ Once some degree of scientific screening separates out real from truly nonexistent problems,⁸⁸ cause-oriented reform is more likely than effects-based regulation to identify and address human activity that can cause multiple environmental problems.⁸⁹ Perhaps most importantly, the focus of cause-oriented reform should be on incentives most likely to ameliorate environmentally harmful activity without greatly reducing the benefits of such activity. Because incentive structures can be difficult to design, cause-oriented reform may in many instances need to proceed experimentally. To that extent, it envisions a far more dynamic and incremental regulatory process than the static calibrations of comprehensive rationality and risk-oriented reform. Yet such a dynamic approach to regulation not only promises to avoid large miscalculations by government but also promises to develop incentives for cost-effective innovation among private market participants.

As I develop more fully with the case of pesticides, properly designed cause-based reform can be more effective, more normatively defensible, and even more cost-effective than either current regulatory programs or proposed risk-oriented regimes.

II. Reframing the Debate over Pesticide Policy

At the core of federal pesticide regulation is a tale of two statutes, the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA)⁹⁰ and, secondarily, the Federal Food, Drug and Cosmetic Act (FFDCA).⁹¹ In contrast to more pervasive federal environmental laws that regulate broader fields of economic activity,⁹² FIFRA might be viewed as an "off-center" environmental statute, governing a discrete subset of toxic substance use.⁹³ FIFRA has central relevance for risk-oriented reform, however, because it was the first environmental statute to adopt an "unreasonable risk" standard for

87. See, e.g., Lyndon, *supra* note 23, at 291 (discussion of the intensity of informational needs and complexities of structuring meaningful dose-response curves).

88. Of course, I recognize that "cause" and "problem" must be linked by sufficient scientific information to screen out those "problems" that might not exist by any criterion or which are by all appropriate criterion truly de minimis.

89. Pesticide use, for example, can cause more than eight different categories of harm. See *infra* text accompanying notes 131-38.

90. 7 U.S.C. §§ 136-136y (Supp. 1991).

91. 21 U.S.C. §§ 301-393 (1988).

92. See Office of Policy, Planning and Evaluation, U.S. Env'tl. Protection Agency (PM-222A), Environmental Problem Area Profiles, 3 (July 20, 1991) (unpublished paper, on file with author) (control of criteria air pollutants under the Clean Air Act accounted for 30% of public and private expenditures for environmental protection in 1987).

93. See *id.* at 12 (pesticide regulation in 1987 accounted only for 0.53% of total public and private environmental expenditures).

decisionmaking and it thus is in FIFRA that the country has accumulated its most lengthy experience with risk-based environmental policymaking.⁹⁴

Under FIFRA, no one may distribute or sell for a specific use a "pesticide"—defined broadly to include any insecticide, herbicide, or other substance for the control of a "pest"⁹⁵—unless the pesticide has been "registered" with EPA for that specific use.⁹⁶ EPA will register new pesticides and "reregister" older ones⁹⁷ so long as the pesticides are designed to accomplish their intended effects without causing "unreasonable adverse effects on the environment,"⁹⁸ a standard defined as "any unreasonable risk to man or the environment, taking into account the economic, social, and environmental costs and benefits of [the pesticide's] use."⁹⁹ If new information leads EPA to suspect that a registration can no longer be supported, it may begin proceedings to "cancel" the pesticide's registration, either in whole or as to specific applications.¹⁰⁰ EPA may also "suspend" a pesticide's registration during the pendency of cancellation proceedings if necessary to prevent an imminent hazard to the public.¹⁰¹

If a pesticide's use is expected to cause residues to remain in or on food, EPA will not register that use under FIFRA unless it has also granted a residue "tolerance" under FFDCA.¹⁰² Tolerance-setting is governed by FFDCA Sections 408 and 409. Section 408 governs tolerances for "raw" agricultural commodities such as milk and fresh produce.¹⁰³ Like a pesticide's registration under FIFRA, a Section 408 tolerance is granted on the basis of a risk-benefit calculus;¹⁰⁴ accordingly, EPA may, and has, granted tolerances

94. See Applegate, *supra* note 22, at 268.

95. See 7 U.S.C. § 136(u) (1988) (the term "pesticide" means "any substance . . . intended for preventing, destroying, repelling, or mitigating any pest" and "any substance . . . intended for use as a plant regulator, defoliant, or desiccant"). See also *id.* § 136(t) (the term "pest" means "any insect, rodent, nematode, fungus, weed . . . or any other form of terrestrial or aquatic plant or animal life or virus, bacteria or other micro-organisms [except those on living humans or animals]").

96. *Id.* § 136a(a).

97. In 1972, FIFRA was amended to require the "reregistration" of previously registered pesticides under contemporary standards of "unreasonable risk." See Pub. L. No. 92-516, sec. 2, § 2(z), (bb), § 3(c)(5), 86 Stat. 973, 979-81 (codified at 7 U.S.C. § 136(z), (bb) and 7 U.S.C. § 136a(c)(5) (1972)) (amended 1991).

98. 7 U.S.C. § 136a(c)(5)(C),(D) (1988).

99. *Id.* § 136(bb).

100. *Id.* § 136d(b) (1988). See *Environmental Defense Fund v. EPA*, 510 F.2d 1292 (D.C. Cir. 1975).

101. *Id.* § 136d(c).

102. See 21 U.S.C. §§ 346a, 348 (1988); 40 C.F.R. § 152.112(g) (1991). EPA expresses tolerances as parts per million of pesticide residue in or on the food being evaluated.

103. See 21 U.S.C. § 346a(a).

104. See *id.* (Administrator shall establish tolerances "to the extent necessary to protect human health" after giving "appropriate consideration" to the need for the production of an adequate, wholesome and economical food supply); *Food Safety Amendments of 1989: Hearings on H.R. 1725 Before the Subcomm. on Health and the Environment of the House Comm. on Energy and Commerce*, 101st Cong., 1st Sess. 133-38 (1989) (testimony of EPA Acting Deputy Director John A. Moore) (EPA uses a subjective risk-benefit analysis for each case).

for residues of oncogenic pesticides (those pesticides which can cause tumors in laboratory test animals under certain conditions) when the agency believes that the health risks to human beings are relatively small.¹⁰⁵ Section 409 governs tolerances for "processed" foods such as applesauce.¹⁰⁶ In contrast to the risk-benefit standard for raw commodity tolerances, Section 409 is governed by the special decisional rule of the Delaney Clause, which prohibits any pesticide residues in processed foods "found to induce cancer in humans or animals."¹⁰⁷

Although much of pesticide regulation is found in the evolution and intricacies of FIFRA and FFDCA, there are certainly other relevant bodies of law. In different factual settings, the manufacture, use, or disposal of pesticides can trigger regulatory concern under the Toxic Substances Control Act (TSCA),¹⁰⁸ the Clean Air Act,¹⁰⁹ the Emergency Planning and Community

105. See NATIONAL RESEARCH COUNCIL, REGULATING PESTICIDES IN FOOD: THE DELANEY PARADOX 67 (1987) ("EPA has about 2,500 section 408 tolerances for oncogenic pesticides").

106. See 21 U.S.C. § 348 (1988). EPA, however, does not require a Section 409 tolerance for processed foods containing pesticide residues at or below the Section 408 tolerance level.

107. The Clause is named after Representative James Delaney of New York who chaired extensive hearings on the safety of pesticides over a two-year period between 1950 and 1952. See *Hearings Before the House Select Comm. to Investigate the Use of Chemicals in Foods and Cosmetics*, 81st Cong., 2d Sess. (1950), 82d Cong., 1st Sess. (1951), and 82d Cong., 2d Sess. (1952) (popularly known as the "Delaney Committee" hearings). There are actually two "Delaney Clauses" in different sections of the FFDCA. See 21 U.S.C. §§ 348(c), 360b(d)(1)(I). Although the Clause seems unequivocally to allow no room for consideration of a carcinogen's dose, see Richard A. Merrill, *Regulating Carcinogens in Food: A Legislator's Guide to the Food Safety Provisions of the Federal Food, Drug, and Cosmetic Act*, 77 MICH. L. REV. 171, 181 (1978), EPA has since 1988 adopted a de minimis standard that allows the Agency to avoid the zero-risk impact of the Delaney Clause where the Agency believes the human dietary risk from a pesticide residue is "at most negligible," see *Regulation of Pesticides in Food: Addressing the Delaney Paradox* Policy Statement, 53 Fed. Reg. 41,104 (1988) (giving notice of EPA's intent to adopt a negligible risk exception to the Delaney Clause) (issued Oct. 14, 1988). In July 1992, the Ninth Circuit Court of Appeals rejected EPA's policy as inconsistent with the plain language of the statute. See *Les v. Reilly*, 968 F.2d 985 (9th Cir. 1992), cert. denied, 113 S. Ct. 1361 (1993).

108. 15 U.S.C. §§ 2601-2671 (1988). TSCA's broad definition of "chemical substance" specifically excludes any pesticide "when manufactured, processed, or distributed in commerce for use as a pesticide", *id.* § 2602(2)(B)(ii). Under this exclusion, however, TSCA reaches chemical substances such as "inert ingredients" that are not yet a pesticide component or "intermediate substances" that are used in manufacturing pesticides; neither of these two categories of substances are considered a "pesticide" by EPA. See 42 Fed. Reg. 64,572, 64,586 (1977) (codified at 40 C.F.R. pt. 710). Even substances intended for use as pesticides will come under TSCA scrutiny while undergoing research and development. Until the manufacturer intends to receive a benefit in pest control from the substance's use, it is not subject to FIFRA and will fall under TSCA. See 51 Fed. Reg. 15,096, 15,098 (1986) (codified at 40 C.F.R. pt. 720).

109. Pesticide manufacturers who emit quantities of their products into the air are subject to Section 112 of the Clean Air Act, which lists among its "hazardous air pollutants" such pesticides as toxaphene, chlordane, and heptachlor, see 42 U.S.C. § 7412(b) (1988). Section 112 subjects "major sources" of hazardous air pollutants to special emission standards based on emission controls achieved by the "best controlled similar source" (for new sources) or the average emission controls achieved by the "best performing 12 percent of the existing sources" for each pollutant. *Id.* §§ 7412(d)(3), 7414(d)(3)(A). In determining whether pesticide manufacturing plants are major stationary sources, fugitive emissions are "counted" because pesticide manufacturers are defined within the special category of "chemical process plants." See 40 C.F.R. § 51.165(a)(1)(iv)(c)(20) (1992).

Right to Know Act,¹¹⁰ RCRA,¹¹¹ CERCLA,¹¹² the Safe Drinking Water Act,¹¹³ the Clean Water Act,¹¹⁴ the Occupational Safety and Health Act,¹¹⁵ and NEPA.¹¹⁶ There is also an impressive body of state and,

110. Superfund Amendments and Reauthorization Act, Title III, Pub. L. No. 99-499, 100 Stat. 1613 (codified in scattered sections of 10, 20, 26, and 42 U.S.C. (1986)). Pursuant to this Title, EPA promulgates a list of "extremely hazardous substances," many of which are pesticides, *see* 40 C.F.R. § 355, app. A (1992), for which "threshold planning quantities" are given. A facility possessing a listed pesticide in amounts greater than the thresholds is required to prepare Material Safety Data Sheets as well as emergency and hazardous chemical inventory forms for each pesticide and submit them to the state and local emergency response agencies and to the local fire department. Companies processing or manufacturing pesticides must also estimate any amounts released into the environment and report such releases annually on Toxic Chemical Release Forms, 42 U.S.C. § 11023 (1988), 40 C.F.R. §§ 370.20-370.25 (1992).

111. 42 U.S.C. §§ 6901-6982k (1988). Pesticides are listed RCRA "hazardous wastes," *see* 40 C.F.R. § 261 (1992), making generators subject to record keeping, labeling, storage, handling, and reporting requirements, *see* 42 U.S.C. § 6922 (1992). Further requirements may apply if pesticides are stored (as they often are) at pesticide manufacturing plants. *Id.* § 6924(a).

112. CERCLA defines "hazardous substance" in ways that can implicate pesticides, such as hazardous air pollutants listed under Clean Air Act Section 112, 42 U.S.C. § 9601(14) (Supp. 1990), but also provides an exemption from liability for certain pesticide uses, *id.* § 9607(i) ("no person . . . may recover under the authority of this section for any response costs or damages resulting from the application of a pesticide product registered under [FIFRA]"). EPA, however, does not consider a pesticide spill to be an "application" of a pesticide within the meaning of the exemption. *See* 50 Fed. Reg. 13,456, 13,465 (1985) (codified at 40 C.F.R. pts. 117 & 302). Although sellers of pesticides can be excluded from CERCLA liability if there is no evidence of an arrangement on their part for disposing of the pesticide, *see* Florida Power & Light Co. v. Allis Chalmers Corp., 893 F.2d 1313, 1317 (11th Cir. 1990), pesticide producers that contract out to formulators certain processes are considered to retain ownership of the pesticides and liable for spills by the formulators, *see* United States v. Aceto Agricultural Chem. Corp., 872 F.2d 1373 (8th Cir. 1989) (rejecting producer's argument that it could be liable only if it "intended" to arrange for disposal).

113. *See supra* note 61.

114. The pesticide industry is considered a "primary industry" under the Clean Water Act's National Pollutant Discharge Elimination System provisions and individual plants need permits to discharge pollutants. *See* 40 C.F.R. § 122, app. A (1990). Many pesticides, moreover, are listed as "toxic pollutants" under Section 307, *see id.* § 116.4, requiring notification of discharges above listed "reportable quantities." *Id.* § 117.3. Since 1977, EPA has controlled toxic pollutants using health-based regulations that often impose more stringent standards on pesticide manufacturers than might have been imposed under the Clean Water Act's technology-based limitations on conventional pollutants. *See* Hercules Inc. v. EPA, 598 F.2d 91 (D.C. Cir. 1978) (upholding use of health-based standards in regulating discharges of the pesticides endrin and toxaphene).

115. 29 U.S.C. §§ 651-678 (1988). A 1990 Memorandum of Understanding between EPA and the Occupational Safety and Health Administration (OSHA) establishes a framework for notification, consultation, and coordination to assist EPA in identifying environmental problems involving pesticides and OSHA in identifying any resulting workplace health and safety problems. Memorandum of Understanding between the U.S. Dep't of Labor, OSHA and the Env'tl. Protection Agency, Office of Enforcement (Nov. 23, 1990). OSHA has established exposure limits for pesticides determined to be air contaminants, *see* 29 C.F.R. § 1910.1000 (1992), and other regulations for pesticides of concern, *see id.* § 1910.1047. OSHA may regulate pesticides in areas where EPA has not exercised its authority. *See* Public Citizen Health Research Group v. Aucter, 554 F.Supp. 242 (D.D.C. 1983) (OSHA may set an emergency standard for EtO (a pesticide) when concerned with the health effects to workers stemming from its use as a hospital sterilant). OSHA may not, however, regulate pesticides when EPA has exercised regulatory control. *See* Organized Migrants in Community Action, Inc. v. Brennan, 520 F.2d 1161 (D.C. Cir. 1975) (OSHA may not set standards concerning time of reentry for farm workers with respect to fields treated with pesticides, where EPA has already promulgated regulations).

116. Although EPA is not required to comply with NEPA (by performing an environmental assessment or environmental impact statement) when registering pesticides, *see* Merrell v. Thomas, 807 F.2d 776 (9th Cir. 1986), NEPA has been used to halt or delay federal programs that involve the spraying of pesticides, *see, e.g.* Northwest Coalition for Alternatives to Pesticides v. Lyng, 844 F.2d 588 (9th Cir. 1988) (injunction issued, and then dissolved, upon "adequate discussion of alternatives" in environmental impact

increasingly, local regulatory law¹¹⁷ as well as state common law.¹¹⁸ But, despite the occasional significance of these other sources of pesticide law, regulation under FIFRA and FFDCA remains the center of gravity of federal pesticide policy.

For all its complexity, however, it is important to underscore what pesticide regulation is not: it is not a body of law that addresses in any strategic way the underlying prevalence of pesticides in American agriculture, nor is it a body of law designed to minimize pesticide use. On reflection, this characteristic is especially striking because the impetus for modern pesticide regulation, if not for the modern environmental movement in general, was the argument made in 1962 by Rachel Carson in *Silent Spring*¹¹⁹ for developing just such a strategic environmental law. In what she called "the other road," Carson argued for the development of pesticide policies based on the biological understanding of pests as "living organisms . . . [within] the whole fabric of life to which [they] belong."¹²⁰ Although EPA still chooses occasionally to boast that the Agency exists as "the extended shadow of *Silent Spring*,"¹²¹ in truth the defining features of modern pesticide regulation languish far too much in the "shadow" of Rachel Carson's vision of what an enlightened strategy for crop protection should be—a fact perhaps demonstrated most succinctly by an *increase* in pesticide usage between 1964 and 1982 of

statement); *Oregon Environmental Council v. Kunzman*, 714 F.2d 901 (9th Cir. 1983) (requiring site-specific, rather than programmatic environmental impact statement, for aerial spraying of herbicides on public forests).

117. Nearly all states have generic labeling requirements that supplement federal law, *see, e.g.*, IDAHO CODE § 22-3401(3) (Supp. 1992). There is also a growing number of notification requirements and other restrictions imposed on residential pesticide spraying operations (particularly affecting commercial lawn care services). *See, e.g.*, ARIZ. REV. STAT. ANN. § 3-365 (1989) (certain pesticides may not be applied within specified distance of schools, day care centers, and health care centers); CAL. FOOD & AGRIC. CODE § 29080 (West Supp. 1992) (beekeepers must be notified of local pesticide spraying); CONN. GEN. STAT. ANN. §§ 22a-66a (West 1991) (pesticide applicators must inform owner of property of the identity of the pesticide being used, any hazards associated with it and any emergency precautions available, and leave notification signs posted on treated property).

In *Wisconsin Public Intervenor v. Mortier*, 111 S. Ct. 2476 (1991), the Supreme Court held that local governmental regulation of pesticides was not preempted by FIFRA. More recently, California's Proposition 65 survived a preemption challenge against its requirements for point-of-sale warnings. *See Chemical Specialties Mfrs. Ass'n v. Allenby*, 958 F.2d 941 (9th Cir. 1992). The pesticide industry has mounted an aggressive legislative effort to encourage states to adopt legislation prohibiting local pesticide regulation. As of June 1992, thirteen states had adopted such legislation in the wake of the *Mortier* decision. *See One Year After Local Pesticide Use Controls Upheld, Debate Continues in State Legislatures, City Halls, Congress*, 16 Chem. Reg. Rep. (BNA) No. 14, at 687 (July 3, 1992).

118. *See, e.g.*, *Ferebee v. Chevron Chemical Co.*, 736 F.2d 1529 (D.C. Cir. 1984) (FIFRA does not preempt state tort suits based on inadequate labeling). *But see Papas v. Upjohn*, 926 F.2d 1019 (11th Cir. 1991) (FIFRA impliedly preempts state common law tort claims for inadequate labeling). The Supreme Court recently granted certiorari to resolve the emerging split among the circuits—but to no avail. *See Arkansas-Platte Gulf Partnership v. Dow Chemical Co.*, 959 F.2d 158 (10th Cir.), *vacated*, 113 S. Ct. 314 (1992), *reaff'd*, 981 F.2d 1177 (10th Cir. 1993).

119. *See generally* RACHEL CARSON, *SILENT SPRING* (1962).

120. *Id.* at 277, 278.

121. *Id.* at 6, *cited in* H. PATRICIA HYNES, *THE RECURRING SILENT SPRING* 49 (1989).

170%.¹²² It is to explore the forces which have shaped both pesticide use and pesticide regulation that I now turn.

A. A Cause-Oriented Perspective on Pesticide Use: Prisoners' Dilemmas and Technology Treadmills

It is useful at the outset to question what is perhaps the most direct reason often given for pesticide use in the United States: because it works.¹²³ The critical issue, of course, is what one means by "works." From the perspective of productivity gains, there is certainly impressive evidence that for many crops, pesticides increase yields and reduce labor costs, at least in the near term; aggregate estimates of productivity gains indicate a 400% rate of return on the pesticide dollar.¹²⁴ Yet there is also evidence that these gains are often not sustained over the long run, due to the counterproductive tendency of pesticides to induce genetic "resistance" in target pests¹²⁵ and to destroy beneficial insects that previously had helped to check target pest populations.¹²⁶ Accordingly, there are aggregate data which reveal that the country lost in 1987 almost precisely the same percentage of its crops to pests as it did in 1900—despite the application in 1987 of some 430 million pounds of

122. BOARD ON AGRIC., NATIONAL RESEARCH COUNCIL, NATIONAL ACADEMY OF SCIENCES, *ALTERNATIVE AGRICULTURE* 44 (1989) [hereinafter NATIONAL RESEARCH COUNCIL].

123. See, e.g., *Hearings on FIFRA Before the House Comm. on Agric.*, 94th Cong., 2d Sess. 133 (1977) (statement of Arthur Bassett, Onondaga County, New York, Pest Control Association) ("Without pesticides, our concern will not be that of a silent spring, but a silent summer, silent autumn, silent winter and a silent world. Silence will be broken only by those crying for food. The name of that game is famine!"); HOUSE COMM. ON AGRIC., 94TH CONG., 1ST SESS., BUSINESS MEETINGS ON FIFRA EXTENSION, pt. 2, 129 (Comm. Print 1976) (remarks of Rep. Poage) ("Without pesticides every one of us is going to starve in about three weeks. It is inevitable. You cannot feed the world and go back to the ecology that existed here when this country was discovered").

124. David Pimentel et al., *Benefits and Costs of Pesticide Use in U.S. Food Production*, 28 *BIOSCI.* 772, 781 (1978).

125. Although individual pest organisms, of course, cannot "become" resistant, pesticides operate on the genetics of pest populations by killing off most individuals and leaving those which happen to enjoy some measure of genetic resistance to become the breeding stock for a resistant population. In 1938, "scientists knew of just seven insect and mite species that had acquired resistance to pesticides. By 1984, that figure had climbed to 447, and included most of the world's pests." Sandra Postel, *Controlling Toxic Chemicals*, in *STATE OF THE WORLD 1988*, 122 (Linda Starke ed. 1988) (citing George P. Georgioui, *The Magnitude of the Resistance Problem*, in NATIONAL RESEARCH COUNCIL, *PESTICIDE RESISTANCE: STRATEGIES AND TACTICS FOR MANAGEMENT* (Wash. D.C.: National Academy Press, 1986)). Perhaps the most notorious example of resistance in the United States involved a resistant tobacco budworm which fed on cotton and caused the collapse of cotton-growing in southern Texas between 1968 and 1975. See P. L. Adkisson et al., *Controlling Cotton's Insect Pests: A New System*, 216 *SCI.* 19-22 (1982).

126. There are actually several related effects. "Resurgence" occurs when a pesticide eliminates the natural enemies of a pest and the surviving pest individuals quickly surpass their original numbers. See Angus A. MacIntyre, *Why Pesticides Received Extensive Use in America: A Political Economy of Agricultural Pest Management to 1970*, 27 *NAT. RESOURCES J.* 533, 552 (1987). "Secondary pest outbreaks" occur when a species that had not theretofore been a pest suddenly attains harmful densities (and becomes a pest) after pesticides kill off the species' natural enemies. *Id.* at 552-53.

pesticides.¹²⁷ By yet another measure, which considers the marginal benefits of pesticides over "alternative" pest control measures,¹²⁸ there are data showing that pesticide use on some (and perhaps many) crops could be cut in half without significant decreases in yields.¹²⁹

If it is unclear whether the intended effects of pesticides can support the nonqualified claim that pesticides "work," certainly any final judgment on the question must also consider unintended effects. EPA's Science Advisory Board concluded in 1990 that, when compared with dozens of other risks, pesticides presented one of the country's more widespread and severe environmental problems.¹³⁰ Apart from accelerating the development of resistant pests, pesticides can cause at least eight other broad types of unintended effects: acute or chronic health effects among workers in the manufacturing process;¹³¹ acute or chronic health effects on third parties due to accidents in manufacturing or transport;¹³² acute and chronic health problems among applicators and farmworkers;¹³³ contamination of groundwater due to leaching;¹³⁴ contamination of surface waters from farm run-off;¹³⁵

127. See Postel, *supra* note 125, at 122 ("Insects and weeds now reduce crop production by about 30 percent, apparently no less than before the chemical age dawned").

128. For descriptions of these measures. see *infra* at notes 172-77.

129. See JENNIFER CURTIS ET AL., HARVEST OF HOPE: THE POTENTIAL FOR ALTERNATIVE AGRICULTURE TO REDUCE PESTICIDE USE 4 (1991) ("A new study by Cornell University Entomologist, David Pimentel, estimates that if 50 percent of pesticides now used in American agriculture were replaced by nonchemical control techniques, crop yields would not decline and food prices would rise less than one percent") (citing David Pimentel et al., *Environmental and Economic Impacts of Reducing U.S. Agricultural Pesticide Use*, in HANDBOOK OF PEST MANAGEMENT IN AGRICULTURE (1991); COMM. ON THE ROLE OF ALTERNATIVE FARMING METHODS IN MODERN PRODUCTION AGRICULTURE, BOARD ON AGRIC., NAT'L RESEARCH COUNCIL, ALTERNATIVE AGRICULTURE 209-12 (1989) (an evaluation of IPM for insects on nine crops in ten states shows in every case higher average per acre yield for IPM users over nonusers growing same crop in same state despite reduced pesticide use, reduced costs of production, or both).

130. EPA SCIENCE ADVISORY BOARD, *supra* note 27, at 8; Office of Policy, Planning & Evaluation, *supra* note 92, at 12.

131. See Elise M. Burton, Note, *Interagency Race to Regulate Pesticide Exposure Leaves Farmworkers in the Dust*, 8 VA. ENVTL. L.J. 293, 294 (1989) (discussing extent of OSHA's regulation of workplace exposure to pesticides, including exposure during the manufacturing process).

132. Certainly the most notorious example was the explosion of Union Carbide's pesticide manufacturing plant in Bhopal, India that killed over 2,000 people. See Eliot Marshall, *The Rise and Decline of Temik*, 229 SCI. 1369, 1369 (1985). A similar plant owned by Union Carbide in Institute, West Virginia leaked pesticide fumes in August 1985, sending 135 people to the hospital but causing no permanent injuries. *Id.*

133. The Bureau of Labor Statistics estimates that each year, between 800 and 1,000 people die and between 80,000 and 300,000 become injured as the direct result of occupational exposure to agricultural pesticides. See OSHA Field Sanitation: Final Rule, 52 Fed. Reg. 16,050 (1987) (codified at 29 C.F.R. pt. 1928); R. WASSERTON & R. WILES, FIELD DUTY: U.S. FARMWORKERS AND PESTICIDE SAFETY 3 (1985).

134. EPA has confirmed that 46 pesticides have contaminated the groundwater of 26 states as a result of normal agricultural use. See *EPA Threatens Grants Cut, Construction Ban for Lack of Auto Inspection Program in Ohio*, 19 Env't Rep. (BNA) No. 34, at 1755-56 (Dec. 23, 1988). Other researchers, using the same data base as EPA, have concluded that 73 pesticides have contaminated the groundwater of 34 states. *Id.* One study has concluded that the cost simply of monitoring wells for groundwater contamination could cost \$7 billion. CURTIS ET AL., *supra* note 129, at 7 ("USDA estimates that first-time monitoring costs of private wells and community water systems for pesticides and nitrate would cost more than \$1.4 billion. . . . Actual clean-up is expected to cost much more").

poisoning of wildlife;¹³⁶ acute and chronic health problems among consumers due to residues on food;¹³⁷ and contamination of the environment due to improper disposal of unused pesticides and their containers.¹³⁸ Although there have been few attempts to measure the overall magnitude of these losses (other than the SAB's recent assessment), a sense of scale may be taken from evidence suggesting that pesticides are involved in 15 percent of the wastes at federal Superfund sites imposing extensive remediation costs;¹³⁹ there are over 27,000 yearly instances of poisonings by pesticides among applicators and farmworkers;¹⁴⁰ pesticide residues on food are estimated to cause each year hundreds of "excess" chronic health effects, including cancers, among consumers;¹⁴¹ and pesticides are responsible for significant wildlife losses, including in some instances irreparable losses among populations of threatened or endangered species.¹⁴² From a cost-benefit perspective, the cumulative losses may well outweigh the cumulative benefits of pesticides.¹⁴³

For the purposes of my argument, however, it is unnecessary to conclude dispositively that the aggregate costs of pesticides outweigh the aggregate

135. See, e.g., John H. Davidson, *Environmental Analysis of the Federal Farm Programs*, 8 VA. ENVTL. L.J. 235, 235 (1989) ("Twenty-seven states have explicitly recognized agriculture as the primary cause of nonpoint source problems on rivers, and twenty-four states have found agriculture to be the largest nonpoint source polluting lakes").

136. See *infra* text accompanying notes 319-23 (discussing effects on wildlife of government eradication campaigns in the 1950s). See also CARSON, *supra* note 119, at 103-52.

137. The National Research Council has estimated that if worst case assumptions were valid, there would be an increased risk of 5,800 cancers per million people over a 70-year lifetime, which translates into 1.4 million additional cases for the current population or 20,000 additional cases yearly. See NATIONAL RESEARCH COUNCIL, *supra* note 105, at 74. See also *Meta-Analysis of Studies Indicates Higher Risks of Certain Cancers in Farmers*, 16 Chem. Reg. Rep. (BNA) No. 26, at 1153 (Sept. 25, 1992) (National Cancer Institute's new meta-analysis of epidemiological studies suggests that the "rising rates for some tumors" among the general population may in fact be due to consumer exposure to agricultural chemicals.).

138. See JOHN D. CONNER, JR. ET AL., PESTICIDE REGISTRATION HANDBOOK 361-70 (3d ed. 1991).

139. In a 1987 sample of Superfund sites involving treatment of wastes, pesticides represented 7% of solid wastes and 8% of aqueous wastes for a total of 15% of total wastes. Donald C. White et al., *Summary of Hazardous Waste Treatment at Superfund Sites*, 18 Env't Rep. (BNA) No. 17, at 1122 (Aug. 21, 1987). EPA predicted in May, 1992 that it would cost \$200,000 simply to stabilize one pesticide Superfund site in Imperial County, California designated for emergency response action. *Abandoned Pesticide Storage Facility Target of \$200,000 Emergency Cleanup By EPA*, 23 Env't Rep. (BNA) No. 5, at 434 (May 29, 1992).

140. See, e.g., I HANDBOOK OF PESTICIDE TOXICOLOGY 281-282, tables 7.5 & 7.6 (W. Hayes, Jr. & E. Laws, Jr. eds. 1991) (In 1985, there were 35,999 pesticide poisonings reported to poison control centers in the United States; global estimates for accidental poisonings range from 500,000 (with 5,000 annual deaths) to 2.9 million (with 200,000 deaths)).

141. On oncogenic effects, see NATIONAL RESEARCH COUNCIL, REGULATING PESTICIDES IN FOOD: THE DELANEY PARADOX, *supra* note 105 (worst-case possibility of 20,000 additional cases yearly); *Chemical Exposure During Pregnancy Linked to Fetal Death, Birth Defects*, 15 Chem. Reg. Rep. (BNA) No. 49, at 1790 (Mar. 13, 1992) (congenital abnormalities in higher-than-expected numbers in women exposed to pesticides during first trimester).

142. See, e.g., *Possible TSCA Changes, Pollution Prevention Emphasis, Pesticide Reregistration, HMTA Rules Sees Top 1992 Issues*, 15 Chem. Reg. Rep. (BNA) No. 41, at 1496 (Jan. 17, 1992); *Use Of 37 Chemicals May be Restricted by North Dakota Endangered Species Program*, 15 Chem. Reg. Rep. (BNA) No. 15, at 467 (July 12, 1991) (adverse effects on wildlife have forced North Dakota to prohibit applications of 37 different kinds of pesticides under its endangered species program).

143. See Pimentel et al., *supra* note 129, at 1-123; Pimentel et al., *supra* note 124, at 772-81.

benefits. In fact, there are insufficient data for such a comprehensive analysis and the precise structure of the calculation would be complex and contestable.¹⁴⁴ But it is enough that there is a plausible case against the simple explanation that pesticides are used in America because, on balance, they "work." For if this most direct justification is questionable, it highlights the possibility that there may well be other factors which account for the pervasive use of pesticides in American agriculture.

There are several economic reasons why individual farmers might use pesticides to a greater extent than might be justified by an aggregate cost-benefit calculation. First, the unintended effects of pesticides might be true economic externalities—losses borne by others without corrective legal mechanisms which can bring back (internalize) the losses to the individual pesticide users.¹⁴⁵ Second, even for those losses that farmers will themselves experience, such as the eventual effects of pesticide-resistant pests, it may still be economically rational for an individual farmer to continue unabated her level of pesticide use. This is because of what Garrett Hardin termed "the tragedy of the commons": the pesticide user will be able to reap the full benefits of high pesticide use in the short term (greater yields on her crops) but will only bear part of the costs of the common problem she will share with all other farmers in the future (resistant pests).¹⁴⁶ Third, there can operate classic prisoners' dilemmas: farmers know they would be better off cooperating to reduce pesticide use; but, fearing "cheating" by other farmers, each decides to maintain the current level of pesticide use even though all will end up the worse for it.¹⁴⁷

144. See J.C. HEADLEY & J.N. LEWIS, *THE PESTICIDE PROBLEM: AN ECONOMIC APPROACH TO PUBLIC POLICY* 37-60 (1967) (problems in categorizing spillovers as negative or positive and benefits as real or ostensible are significant and complex conceptual problems in constructing a cost-benefit calculation of pesticide use).

145. See, e.g., *id.* at 1-62 (categorizing numerous possible negative spillovers).

146. See Garrett Hardin, *The Tragedy of the Commons*, 162 *SCI.* 1243, 1244 (1968) (because of imbalance between reaping rewards and sharing burdens, "freedom in a commons brings ruin to all"); James E. Krier, *The Tragedy of the Commons, Part Two*, 15 *HARV. J.L. & PUB. POL'Y* 334 (1992) (describing Hardin's insight) ("[t]he resulting depletion is costly, but the costs are spread across all members of the community. The benefits of exploitation, in contrast, accrue to the individual. The logic is remorseless . . ."); Uri Regev et al., *Pests as a Common Property Resource: A Case Study of Alfalfa Weevil Control*, 58 *AM. J. AGRIC. ECON.* 186, 195 (1976) (because resistance in weevil will be a shared problem among neighboring farmers, it "constitutes a 'common property resource' and a nonregulated market would not yield the optimal solution"); Eli Heuth & Uri Regev, *Optimal Agricultural Pest Management With Increasing Pest Resistance*, 56 *AM. J. AGRIC. ECON.* 543 (1974) (single farms contribute little to pesticide resistance so individual farmers have little incentive to modify their pest control practices even though collectively their actions lead to declining profits) (described in MacIntyre, *supra* note 126, at 553-54).

147. See Brian P. Baker, *Pest Control in the Public Interest: Crop Protection in California*, 8 *UCLA J. ENVTL. L. & POL'Y* 31, 33 (1988) (noting that pesticide programs requiring collective action among farmers raise the prospects of "hold outs" which can undermine cooperation among farmers). On prisoners' dilemmas in general, see RUSSELL HARDIN, *COLLECTIVE ACTION* 2-3 (1982) (in the classic prisoners' dilemma each of two prisoners charged with committing a crime jointly believes it to be to his advantage to confess to the following "deal" put to him by the prosecutor, even though the result is worse than if both

The structure of American agriculture provides ample room for these economic forces to operate. Agriculture remains a keenly competitive enterprise in which individual farmers take large financial risks on their ability to produce a crop.¹⁴⁸ Although there are mechanisms by which farmers can cushion the possibilities of unexpected crop losses or downward market swings,¹⁴⁹ farmers remain classic "price takers"—in most cases unable to influence either the price of inputs (fertilizers, pesticides, labor) or the prices received for their products.¹⁵⁰ As Professor Gerald Torres explains, "[a farmer's] principal control over income is in the number of units he produces for sale."¹⁵¹

From an individual farmer's point of view, the importance of crop yield can inflate the attractiveness of pesticides beyond what a purely neutral economic calculation might predict. As a matter of straightforward marginal analysis, one would expect a farmer to apply pesticides only up to the point where the direct, marginal benefits (increased yield due to the added pesticide application) is outweighed by the additional application's cost.¹⁵² Yet the use of pesticides beyond this point can also be perceived by the individual farmer as "insuring" against the worst-case possibility of pest infestations that can wipe out a season's crop.¹⁵³ Indeed, the insurance function of pesticides has become especially relevant since early in the Twentieth Century, when the advent of synthetic fertilizers made crop rotations unnecessary to condition farmers' fields, causing a transition to monocultures that are far more susceptible to pest blights that can wipe out entire crops.¹⁵⁴ Although commercial and public crop insurance later developed that might have, in theory, reduced the added incentive for prophylactic "insurance sprayings," insurers typically demanded, and still demand, that farmers follow arbitrarily

prisoners cooperated: "If you confess and testify against your partner, he'll get life but you'll go free; the only hitch is that if you both confess, you'll both get a sentence of six years for armed robbery").

148. MacIntyre, *supra* note 126, at 537 ("[t]his single feature, more than any other, has predisposed farmers to adopt technological innovations that reduce production costs and insure their investments against the vicissitudes of nature").

149. Professor Gerald Torres explains that "hedging, forward contracting, price later contracting, and other devices are used primarily to stabilize prices farmers receive." Gerald Torres, *Theoretical Problems with the Environmental Regulation of Agriculture*, 8 VA. ENVTL. L.J. 191, 206 n.59 (1989).

150. *Id.* at 206.

151. *Id.*

152. See HEADLEY & LEWIS, *supra* note 144, at 1-19.

153. The literature on the "insurance" function of prophylactic pesticide applications is large. See, e.g., Uri Regev, *An Economic Analysis of Man's Attraction to Pesticides*, in PEST AND PATHOGEN CONTROL 441 (G. Conway ed. 1984) (as risk-averse entrepreneurs, farmers have tended to use pesticides as part of a "minimax" strategy of reducing year-to-year variability in net income rather than maximizing gains in a given year) (citations omitted); MacIntyre, *supra* note 126, at 541 ("[i]n addition to increasing farm productivity, pesticides provide a measure of protection against uncertainty").

154. See, e.g., JOHN PERKINS, INSECTS, EXPERTS, AND THE INSECTICIDE CRISIS 11-12 (1982) (decline in crop rotation magnified insect pest, crop disease, and weed problems); MacIntyre, *supra* note 126, at 540 (chemical fertilizers and pesticides allowed farmers to adopt monoculture cropping which made farm crops more prone to pest outbreaks).

high "routine" spraying schedules or "locally acceptable" customs of pesticide use as a condition of coverage.¹⁵⁵ Because legal mechanisms to internalize the adverse effects of pesticides are nonexistent or weak, the net effect is a pervasive system of structural incentives for farmers to overspray to protect crop yields.

The incentive to overspray is further compounded by what is known as the "agricultural treadmill." As crop yields rise, of course, the resulting surpluses drive prices down. Although this prospect might be expected to encourage cooperation to prevent surpluses, the existence of output-enhancing technologies such as fertilizers and pesticides instead trap farmers within a classic prisoners' dilemma: individual farmers are forced to increase productivity lest other farmers increase their yields and create surpluses which drive market prices lower.¹⁵⁶ Moreover, the developing consumer preference for cosmetically "perfect" produce (itself induced by the high level of cosmetic quality achievable with pesticides) reinforces the incentives for individual farmers to use pesticides to avoid being relegated to secondary produce markets at even further reduced prices.¹⁵⁷ The result is a commonly observed pattern in agriculture: farmers who do not adopt improved technologies are "left with shrunken incomes since their unit costs of production remain high while prices received [are] falling."¹⁵⁸ Few rational farmers can afford to step off the agricultural treadmill.

Although federal farm programs were designed to address in some respects the forms of market failure I've described, as to pesticides they have tended merely to add their own structural incentives to overspray (even despite recent legislative attempts to reduce these incentives). The country's modern farm program was originally framed by the Agriculture Adjustment Acts of 1933 and 1938,¹⁵⁹ and is now found in the "permanent legislation" of the Agricultural Act of 1949¹⁶⁰ to which policy reverts in the event Congress fails to enact a new "Farm Bill" every five to seven years.¹⁶¹ Taken together, farm legislation seeks to moderate the destructive effects of surpluses and price

155. POLICY CONSTRAINTS RESOLUTION TEAM, *supra* note 58, at 14-17 (key management practices used to evaluate loan applications stifle shift away from conventional pesticide use); A. NELSON & W. MURRAY, AGRICULTURAL FINANCE 288 (1967) (pesticide-favoring practices of private lenders).

156. See CHRISTOPHER J. BOSSO, PESTICIDES AND POLITICS 26 (1987) ("if each farmer maximizes production to protect personal income, the inevitable aggregate outcome is a glut. The ensuing surplus pounds down commodity prices . . . [but] the individual farmer will not or cannot lower production unilaterally to reduce the surplus, because such a decision would be economically irrational").

157. See MacIntyre, *supra* note 126, at 540 (with advent of pesticides, markets became less tolerant of damaged produce).

158. *Id.* at 541.

159. Agricultural Adjustment Act, ch. 25, 48 Stat. 31 (1933) (codified as amended at 7 U.S.C. § 24 (1988)), ch. 30, 52 Stat. 31 (1938) (codified as amended at 7 U.S.C. §§ 1301-1359 (1988)).

160. Agricultural Act of 1949, Pub. L. No. 81-439, 63 Stat. 1051 (1949) (codified as amended in scattered sections of 7, 12, 15, and 16 U.S.C. (Supp. 1989)).

161. See POLICY CONSTRAINTS RESOLUTION TEAM, *supra* note 58, at 7.

fluctuations on farmers' incomes by a mix of acreage requirements,¹⁶² "deficiency" payments,¹⁶³ and nonrecourse loans.¹⁶⁴ Unfortunately, all of these programs can collectively and independently create disincentives to optimal pesticide use. Although the economic literature on these effects is large and not entirely free from controversy,¹⁶⁵ it is worth highlighting three economically inefficient distortions on which there seems to have developed a consensus. First, the programs themselves encourage especially intensive agriculture and high yields whenever acreage is restricted and farmers are rewarded for getting as much as they can out of what acres remain¹⁶⁶ and whenever farmers are guaranteed deficiency payments, beyond market prices, for however many bushels they produce on "enrolled" acres.¹⁶⁷ Second, the programs are structured to encourage monoculture (a cropping pattern that

162. Acreage requirements are designed to reduce output and are imposed through "set asides," which are not commodity (crop) specific, *see, e.g.*, 7 U.S.C. § 1445b(1)(e)(1) (1982 & Supp. IV 1986) - (wheat), and through specific "acreage limitations," which restrict the amount of cropland a farmer can plant to a particular crop, *see, e.g.*, 7 U.S.C. §§ 1445b-1(e) (wheat) (upland cotton); § 1444(i) (rice); § 1444d(e) (corn and other feed grains) (1982 & Supp. IV 1986).

163. In 1973, Congress allowed for the establishment of "target" prices for certain crops. *See* Agriculture and Consumer Protection Act of 1973, Pub. L. No. 93-86, 87 Stat. 221 (1973) (codified at 7 U.S.C. § 612c (1982 & Supp. IV 1986)). If market prices fail to reach the target, farmers enrolled in "deficiency" programs receive "deficiency payments" equal to the difference between the market and target prices. *See* 7 U.S.C. § 1445b-3 (1982 & Supp. IV 1986).

164. In these programs, the Commodity Credit Corporation (CCC), established in 15 U.S.C. §§ 714-714p (1982 & Supp. IV 1986), offers nonrecourse loans at a government-set loan rate, which acts as a government-guaranteed minimum price for the commodity; if the market price falls below the loan rate, the farmer simply forfeits the crop (the loan's collateral) to the government and keeps the loan. *See, e.g.*, 7 U.S.C. § 1425 (1982 & Supp. IV 1986).

165. Compare Clayton Ogg, *Farm Price Distortions, Chemical Use, and the Environment*, 45 J. SOIL & WATER CONSERV. 45-47 (1990) (commodity programs present barrier to farmers' willingness or ability to use alternative agriculture techniques); Bruce E. Lyman et al., *Commodity Programs and Sustainable Cash Grain Farming*, 45 J. SOIL & WATER CONSERV. 86-87 (1990) (same); U.S. GENERAL ACCOUNTING OFFICE, *ALTERNATIVE AGRICULTURE: FEDERAL INCENTIVES AND FARMERS' OPINIONS* (1990) (same) with CRAIG OSTEN & PHILIP I. SZMEDRA, U.S. DEPT. OF AGRIC., *AGRICULTURAL PESTICIDE USE TRENDS AND POLICY ISSUES* (1989) (commodity programs in part can retire land that was unsuitable for IPM use anyway).

166. As a general matter, Congress in the 1965 Food and Agriculture Act "coupled" farmers' agreement to observe acreage restrictions as a precondition to receiving price supports. *See* RICHARD RHODES, *FARM* 227 (1989). The predictable outcome was to encourage growers to farm allowable acreage as intensively as possible by mechanizing operations, fertilizing heavily, and using pesticides to control weeds and insects. *Id.*; NATIONAL RESEARCH COUNCIL, *supra* note 122, at 70 ("the prospect of higher payments has encouraged heavier use of fertilizers, pesticides, and irrigation than can be justified by market forces in any given year"). The 1985 Farm Bill exacerbated this pro-pesticide bias through "cross-compliance" provisions which disqualified a grower from price supports if she exceeded her assigned "base acres" by planting any other program crop, *see* Pub. L. No. 99-198, 99 Stat. 1354 (1985), codified at 16 U.S.C. §§ 3801-3845 (1988), a requirement that "discourages diversification into rotations involving other program crops"—one of the hallmarks of IPM techniques that reduce the need for pesticides. NATIONAL RESEARCH COUNCIL, *supra* note 122, at 11. In the 1990 Farm Bill, Congress attempted to "decouple" somewhat the link between acreage requirements and price supports by allowing farmers to idle a percentage of their base acres without "losing base" on which to calculate future deficiency payments; the Bill also allows farmers to grow up to 25% of their base in several other crops. *See* POLICY CONSTRAINTS RESOLUTION TEAM, *supra* note 58, at 9.

167. *See, e.g.*, NATIONAL RESEARCH COUNCIL, *supra* note 122, at 239 ("without government [deficiency] payments, continuous corn was found to be the least profitable of the rotations at \$56.00 per acre net return over variable cost compared with \$90 for a corn-soybeans-corn-oats . . . rotation").

requires artificially high pesticide use because it is especially susceptible to pest losses) and to discourage crop rotation (a cropping pattern that is often at the cornerstone of modern "low-input" approaches to pest protection).¹⁶⁸ Third, the programs distort market forces that would tend to "locate" crops in areas where pest control costs are low (fewer pesticide applications needed) by guaranteeing artificially high prices for enrolled crops regardless of where the crops are grown.¹⁶⁹

To avoid any misunderstanding, my argument is not necessarily that the pesticide-related problems of the farm programs outweigh the social benefits to farmers and rural communities that these programs hope to achieve. Nor am I necessarily confident that changes in federal farm programs alone would induce farmers to reduce overreliance on pesticides. For present purposes, it is sufficient to contend that the present rate of pesticide use on American farms may be as much an artificial construct of the structure of American agriculture and of our farm programs as it is a reflection of the inherently beneficial attributes of pesticides themselves.

B. *Past Attempts to Develop a Legal Framework to Reduce Pesticide Use*

Although modern pesticide regulation under FIFRA does not address itself to the underlying possibilities of ineffective and inefficient pest control, it is not difficult to imagine the rough contours of a legal regime that would. Indeed, prior to the commercialization of synthetic pesticides earlier in this century, a considerable body of law sought to create a framework for farmers to solve the collective action problems that effective pest control required. Moreover, there now exist traces of governmental programs and initiatives that seek to reduce the environmental consequences of chemically-dependent agriculture. In this Section, I describe this body of law to highlight several difficulties that any legal system of low-input agriculture must confront: the creation, transfer and effective use of information; the lack of autonomy that

168. Harold O. Carter, *The Three R's of Agricultural Sustainability: Reality, Redirection, and Restraints*, in COUNCIL FOR AGRICULTURAL SCIENCE AND TECHNOLOGY, *ALTERNATIVE AGRICULTURE: SCIENTISTS' REVIEW* 98 (Lowell S. Jordan & James L. Jordan eds., 1990), reprinted in *Alternative Agriculture: Perspectives of the National Academy of Sciences and the Council for Agricultural Sciences and Technology: Hearing Before the Joint Economic Committee*, 101st Cong., 2d Sess. 200 (1990) (noting that federal price support programs encourage monoculture). See also *supra* notes 160-67.

169. See, e.g., POLICY CONSTRAINTS RESOLUTION TEAM, *supra* note 58, at 12 ("The location effect is closely tied to the acreage effect, by encouraging agricultural production in program commodities in areas where, without government subsidization, production costs would be too high. . . . since growing crops appropriate for local conditions minimize pest infestations is a factor in the use of IPM, the location effect does inhibit the use of IPM").

collective pest-control measures might create; and the possible inequities among individual farmers that can arise in a system of collective action.¹⁷⁰

At the core of any alternative legal framework must be an appreciation of the strengths and limitations of what is typically described as "alternative" agriculture. To sidestep a sometimes esoteric debate over what measures should qualify as "alternative,"¹⁷¹ there are basically four types of alternative measures most commonly in use, and about which a scientific literature has developed or is developing. First, there are "cultural" methods to control insects, weeds, and diseases, such as crop rotations, altered planting dates, cultivation, and the planting of border crops.¹⁷² Second, there are "biological control" methods such as the release of predatory or parasitic insects.¹⁷³ Third, there is the deployment of "biorational" pest control measures such as pheromone-baited traps,¹⁷⁴ the release of microbiological pathogens of insects or weeds,¹⁷⁵ and the use of genetically engineered pest control products.¹⁷⁶ Fourth, and probably most importantly, there is the use of "integrated pest management" (IPM), a decisionmaking system designed to use all "suitable" pest control techniques, including chemical pesticides, to keep pest populations below economically injurious levels while satisfying environmental and production objectives.¹⁷⁷

It is fairly plain that alternative pest controls can impose on farmers two types of costs that are generally not imposed to the same extent by chemical pesticides. First, there are often significant information costs involved with more finely-tailored alternative forms of crop protection—such as the need to "scout" a crop to discern the optimal timing of pesticide applications (perhaps the most common IPM technique) or the need to familiarize oneself with the relative effectiveness of a wide assortment of nonchemical measures or products—that clearly transcend the information costs involved in the more routine spraying of a chemical pesticide that may be "automatically" effective against a broad range of pests.¹⁷⁸ Second, to the extent that pest-specific products

170. From a different perspective, these same "difficulties" may also be counted as additional reasons why farmers might rationally have preferred pesticides over alternative methods of pest protection.

171. See Susan M. Braxton, *Alternative Methods of Pest Control and Factors Influencing Their Development and Deployment* 24, 26 (1990) (unpublished manuscript, on file with author) (1990) (IPM is sometimes criticized as a "last hold" for those who want to rationalize the use of agricultural chemicals).

172. See Brian P. Baker, *Pest Control in the Public Interest: Crop Protection in California*, 8 UCLA J. ENVTL. L. & POL'Y 31, 33 (1988).

173. See, e.g., L. E. Caltigaroni, *Landmark Examples in Classical Biological Control*, 26 ANNUAL REVIEW OF ENTOMOLOGY 213-232 (1981); P. DEBACH, *BIOLOGICAL CONTROL BY NATURAL ENEMIES* (1974).

174. Pheromone-baited traps emit chemical scents that draw insects into devices from which they do not emerge. See Braxton, *supra* note 171, at 1.

175. *Id.*

176. *Id.*

177. IPM has been variously defined. Braxton, *supra* note 171, at 24.

178. See POLICY CONSTRAINTS RESOLUTION TEAM, *supra* note 58, at IV-18 ("full implementation of IPM strategies requires that more practitioners be trained to conduct scouting operations, make specific

are used, they will by definition cost more than products that work against a broader range of pests because the pest-specific user market will be smaller and the producer must charge proportionately higher prices to recoup her investments in research and development.¹⁷⁹

Alternative pest control can also pose free rider and collective action problems. For example, the release of predatory insects will rarely be in an individual farmer's economic self-interest because they cannot be confined to the farmer's property and thus will become to that extent a public good whose full value cannot be recouped.¹⁸⁰ Conversely, if farmers seek to join in an areawide organization for the purposes of cooperative pest control, they may face "hold outs" who attempt to free-ride on the cooperating farmers' efforts—¹⁸¹ or, worse, hold-outs whose recalcitrant activities actually undermine the cooperative efforts (say, by maintaining fields which serve as "reservoirs" for common pests¹⁸² or by continuing the use of chemical pesticides that kill predatory insects released by the alternative farmers).¹⁸³

Given the nature of these public goods and collective action problems, the case for government intervention is strong and it should surprise no one that there has already been some experience with corrective legal mechanisms and public programs. In a particularly detailed historical analysis of collective pest control measures, resource economist Brian Baker identifies two types of coercive measures that state and local governments frequently used, mostly in the pre-pesticide era, to ensure publicly coordinated pest control.¹⁸⁴ First, states used their police powers to declare pest-infested property a public nuisance and to order property owners to destroy or otherwise control the affected property at their own expense. Such orders were enforced by a property lien to finance state action should the property owner refuse and the state need to abate the nuisance itself.¹⁸⁵ Second, states authorized the creation of pest control districts upon the request of a majority of affected property owners, allowed districts to levy crop taxes to support collective pest-control measures, and delegated to these districts broad legal powers to enter

pest management recommendations, and evaluate and make adjustments based on the results . . . [i]n some cases, IPM services are not available in many other cases").

179. See, e.g., *id.* at III-12-24 (although EPA has offered some regulatory relief as to the regulatory costs of "alternative" pesticides, "registration and marketing are still substantial costs, [and thus] few products have been brought to market [under even an "Orphan Drug Act" for pharmaceuticals]").

180. See Brian P. Baker, *Pest Control in the Public Interest: Crop Protection in California*, 8 UCLA J. ENVTL. L. 31, 33 (1988) ("Biological control agents present another case of market failure. When an individual farmer releases a biological control agent, such as a predator or parasite, that organism cannot be confined to the particular farmer's property").

181. *Id.* at 33.

182. *Id.* ("For example, if one farmer plants a hostable crop for a given pest, while all neighbors cooperate, the non-cooperating farmer's crop can serve as a reservoir for the pest").

183. *Id.* ("Broad spectrum pesticides can kill predators and parasites introduced for biological control purposes").

184. *Id.*

185. *Id.* at 35-36.

upon and inspect all lands in the district and to "eradicate, remove or prevent the spread" of pests.¹⁸⁶ In addition to these mechanisms, many states have allowed (and still allow) common law tort remedies to farmers whose pest-control strategies are improperly affected by the practices of neighboring farmers.¹⁸⁷

But measures such as these can raise both equity and procedural due process issues which inevitably complicate their use. Forcing expensive, even ruinous, pest-control measures on the few for the good of the many creates equity concerns. Whatever might be the constitutional fate of such measures under the Supreme Court's modern takings-clause jurisprudence, they present the same imbalance of costs and benefits that has made collective "solutions" to other environmental problems politically difficult to implement.¹⁸⁸ The efficiency of collective pest control decisions might also be slowed by due process requirements: the need to give affected growers "some kind of hearing" to argue for or against coercive actions against them proposed by the community (which ironically is the same kind of procedural "inefficiency" championed so forcefully by environmentalists themselves in related situations).¹⁸⁹

Perhaps because collective pest control measures posed complications such as these, the country's fairly well-developed legal infrastructure of public nuisance law and pest control districts was quickly abandoned when inexpensive, seemingly "miraculous" chemical pesticides became widely available shortly after World War II. The new chemicals not only provided farmers with immediate and visible results, but they allowed individual farmers to control their own destinies with a minimum of transaction costs in a way that appealed to their understandable preferences for autonomy.¹⁹⁰

Even when, in the 1960s, evidence began to mount that the chemicals were not quite so miraculous as they had seemed, the government was reluctant to require farmers to forsake the autonomy-enhancing advantages of pesticides. The regulatory focus was on creating administrative machinery under FIFRA to guarantee the flow of "reasonably safe" pesticides. Despite support for

186. *Id.* at 42.

187. Note that the key term is "improperly." See A. Dan Tarlock, *Legal Aspects of Integrated Pest Management*, in *PEST CONTROL: CULTURAL AND ENVIRONMENTAL ASPECTS* 217, 232 (David Pimentel & John H. Perkins eds., 1980) ("In three states, Louisiana, Oklahoma, and Oregon, liability for damage caused by spraying crops on adjoining land has been classified as ultrahazardous. In other jurisdictions liability for injuries resulting from pesticide use is imposed only if negligence is shown").

188. See, e.g., Denis J. Brion, *An Essay on LULU, NIMBY, and the Problem of Distributive Justice*, 15 ENV. AFF. 437, 439 (1988) (recounting examples of political difficulty in siting hazardous waste treatment facility).

189. See, e.g., Comment, *State Mandated Pesticide Application and the Due Process Rights of Organic Farmers*, 17 PAC. L.J. 1301 (1986).

190. See BOSSO, *supra* note 156, at 32 ("Chemicals, by contrast [to cooperative ventures in biological pest control], suited farmers' individualist ethos—each in control of his own destiny—and provided relatively inexpensive, effective, and quick technological fixes").

encouraging an altogether more sustainable "alternative" agriculture from the National Science Foundation,¹⁹¹ the Council on Environmental Quality,¹⁹² the National Research Council's Board on Agriculture,¹⁹³ the Office of Technology Assessment,¹⁹⁴ and EPA's own Science Advisory Board,¹⁹⁵ Congress has legislated only voluntary programs and very modest research efforts.

It is possible that the legislative and regulatory focus on pesticides, rather than on low-pesticide (or no-pesticide) agriculture, reflects something about the nature and limitations of environmental politics. I take up the question of "politics," and its relation to regulatory design, in Part III. It is important to recognize, however, that it is not difficult to *conceive* of policy strategies that might encourage an alternative agriculture that is more ecologically and economically sustainable.

191. In 1971, the National Science Foundation began funding "demonstration" programs designed to showcase "ecologically oriented systems of control that maintain pest populations at non-economic densities so as to optimize economic returns consistent with minimal environmental damage." See Maureen Hinkle, *Legislative Efforts for IPM 1* (Apr. 1989) (unpublished manuscript, on file with author) (referring to a seven-year centrally managed, block-funded proposal demonstrating a 30-40 percent reduction in expenses for producing certain crops using IPM techniques).

192. In 1972, President Nixon's Council on Environmental Quality (CEQ) released an extraordinarily favorable report on IPM which the President highlighted in his State of the Union address. *Id.* at 10. In 1977, President Carter instructed CEQ to "encourage development and application of IPM techniques." *Id.*

193. In 1989, the National Research Council's Board on Agriculture concluded in an influential study that "[w]ider adoption of proven alternative systems would result in even greater economic benefits to farmers and environmental gains for the nation," NATIONAL RESEARCH COUNCIL, *supra* note 122, at 6. Although the Council's conclusions have received support from a variety of researchers in the field, its "case-study" methodology has also attracted some withering criticisms. See, e.g., Leonard P. Gianessi, *Alternative Agriculture: Insights Into the Benefits of Agrichemicals 1* (paper presented at the 1989 Fall Conference of the National Agricultural Chemicals Association, Oct. 19, 1989) (the Council's case studies "support almost the exact opposite conclusion" that chemical pesticides have substantial benefits). Prompted by the Council's study, and perhaps also from the contemporaneous support for "less polluting" farming practices by EPA's Science Advisory Board, see EPA SCIENCE ADVISORY BOARD, *supra* note 27, at 22, Congress in the 1990 Farm Bill sought to relax some of the structural impediments to crop rotation and other IPM techniques. See POLICY RESOLUTION CONSTRAINTS TEAM, *supra* note 58, at 9-10.

194. In 1979, the Office of Technology Assessment declared that the United States Department of Agriculture (USDA) had become the "lead Agency for pest management research, education and demonstration," with six bureaus dividing some \$12 million in research funds annually under the orchestration of a National IPM Coordinating Committee. U.S. OFFICE OF TECHNOLOGY ASSESSMENT, *PEST MANAGEMENT STRATEGIES IN CROP PROTECTION*, VOL. I, 94 (1979). The 1985 Farm Bill began the Low-Impact Sustainable Agriculture (LISA) program to fund applied research and USDA extension service activities designed to "encourage" alternative methods of crop protection. Food Security Act of 1985, codified in various sections of 7 and 16 U.S.C. (1982 & Supp. IV 1986). See generally W.A. Allen & E.G. Rajotte, *The Changing Role of Extension Entomology in the IPM Era*, 35 ANN. REVIEW OF ENTOMOLOGY 379-97 (1990) (discussing LISA program). The 1987 Clean Water Act Amendments required states to develop programs to control "nonpoint" sources of agricultural pollution and authorized some \$23 million in grants for "best management practices," including alternative agriculture techniques. See 33 U.S.C. § 1329 (1988).

195. EPA SCIENCE ADVISORY BOARD, *supra* note 27, at 22.

C. *Probing for Effective Cause-Based Reform*

There are, currently, dozens of policy options to encourage low-input agriculture, ranging from mandated reductions in pesticide use by target dates¹⁹⁶ to pesticide risk taxes¹⁹⁷ to expedited registration of "alternative" pest control products.¹⁹⁸ I endorse none of these specific options here. Rather, I want only to underscore two criteria that should guide the merits of the long-overdue development of a true environmental policy for pesticides.

First, Congress should encourage governmental intervention that addresses the underlying reasons for pesticide overuse. Fitting this criteria would be consideration of two obvious problems for any system of low-input agriculture: risk averse farmers may overuse pesticides as a minimax strategy to avoid catastrophic crop losses, and farmers may overuse pesticides because of their relatively low informational costs.¹⁹⁹ Although the issues have their complexities,²⁰⁰ the arguments appear strong at least in the near term for public subsidization of "IPM" crop insurance premiums²⁰¹ and of significant enhancements for existing "extension" programs that have already been developed to train farmers in the new techniques.²⁰² Policies such as these would be directed to two of the key impediments to widespread adoption of low-input agriculture. To finance these subsidies, Congress might well want to use some of the funds now made available under the farm programs, or perhaps use public resources now spent on EPA's pesticide regulation activities, leaving financing of the FIFRA program entirely to increased fees paid by pesticide registrants.

Second, Congress should bypass the risk-dominated structures in EPA's pesticide office and legislate direct disincentives to pesticide use. Such an approach would have the benefit of "locking in" structural incentives for low-input agriculture and avoiding the implementation slippage that has inevitably occurred in pesticide regulation. Of course, this benefit might also be viewed

196. See POLICY CONSTRAINTS RESOLUTION TEAM, *supra* note 58, at 85 (this proposal is currently endorsed by the Natural Resources Defense Council and is patterned after state-ordered reductions of 50 percent pesticide use in Denmark, Sweden and the Netherlands).

197. See *id.*, at 70-71.

198. See *id.* (discussing EPA proposed Safer Pesticides Policy).

199. See *supra* discussion in text at notes 153-55, 179-80.

200. For example, providing farmers crop insurance to the extent they use low-input techniques raises the moral hazard that they will not use such techniques effectively (because they are "covered" for losses). See POLICY CONSTRAINTS RESOLUTION TEAM, *supra* note 58, at 72-73.

201. See Katherine Reichelderfer, *Environmental Protection and Agricultural Support: Are Trade-Offs Necessary?*, in AGRICULTURAL POLICIES IN A NEW DECADE (Kristen Allen ed., 1990); L. Alenna Bolin, *An Ounce of Prevention: The Need for Source Reduction in Agriculture*, 8 PACE ENVTL. L. REV. 63, 80-88 (1990) (analyzing and proposing "organic crop insurance").

202. See POLICY CONSTRAINTS RESOLUTION TEAM, *supra* note 58 (full use of IPM strategies requires further grower training).

as a cost—both to legislators who want to reserve control over implementation, and to analysts who rightfully fear that Congress might lock-in the wrong incentives (or level of incentives). Certainly the lessons from pesticide regulation predict that such concerns would attend any “direct” congressional action. Accordingly, it is here that incremental, rather than comprehensive, decision-making would be most appropriate. Congress might consider, for example, fairly limited taxes only on those pesticides posing the greatest risk,²⁰³ ratifying the availability of common-law liability for pesticide use (perhaps with an “IPM” defense), or including farmers among other users of toxic chemicals who must report to the Toxic Release Inventory their discharge of such chemicals into the environment. Mechanisms such as these create market-like incentives, as opposed to rigid command-and-control requirements, that can take account of regional and farm-specific differences and permit growers significant flexibility in deciding how best to avoid the disincentives.

III. Political Theory and Policy Reform

For all the possibilities of effectively reframing the policy debate over pesticides, there remains the inescapable question of politics. While risk-oriented reforms are attractive because they promise to bypass politics, one must confront the possibility that risk-based regulation may itself have a peculiarly normative political structure and, in any case, can be used to further (or thwart) politically pre-determined ends. On the other hand, if cause-oriented reforms are attractive because they promise to bypass some of the problems in risk-based regulation, is politics flexible and public-regarding enough for the kind of “probing” that might be required?

The debate over environmental law reform has only recently broadened, at least in the legal literature, to consider explicitly a theory of politics. Certainly this broader debate comes none too soon. For if either interest group theory²⁰⁴ or public choice theory²⁰⁵ is even roughly correct, with the

203. See, e.g., NATIONAL RESEARCH COUNCIL, REGULATING PESTICIDES IN FOOD: THE DELANEY PARADOX table 3-16, at 74 (1987) (noting that almost all oncogenic risk from herbicides can be traced to a single ingredient, linuron, and that nearly 60 percent of all oncogenic pesticide risks in food are from fungicides).

204. To the extent that “interest group theory” is an independent theory of politics, it captures two central ideas. First, political decisions are heavily influenced by “factions” and reflect compromises reached by bargaining among factions—rather than reflecting detached deliberation about “the” public good. See, e.g., Cass R. Sunstein, *Interest Groups in American Public Law*, 38 STAN. L. REV. 29, 32 (1985) (“Distinct from the [civic] republican understanding of government is a competing conception that might be called pluralist. Under the pluralist view, politics mediates the struggle among self-interested groups for scarce public resources”). Second, “interest group theory” usually takes a pessimistic view of pluralism due to the belief that the “logic of collective action,” see *infra* notes 214-15, will provide structural advantages in political effectiveness to narrow special-interest groups vis-a-vis larger, more-difficult-to-organize groups. See, e.g., Jack M. Beermann, *Interest Group Politics and Judicial Behavior: Macey's Public Choice*, 67 NOTRE DAME L. REV. 183, 194 (1991) (“While large groups of relatively impecunious individuals might theoretically pool their resources to defeat the wealthier interests, the costs of organizing will usually outweigh the potential benefits of the influence sought”). The result will be a legislative (or administrative)

implication that political outcomes reflect the relative power of special interests rather than public-regarding deliberation, then one should immediately question whether environmental policymaking (and environmental law reform) should be anchored so firmly in politics, be they those of Congress or the Executive. Indeed, it is to just such a pessimistic theory of politics that "free market environmentalists" point when urging the creation of "well-specified property rights"²⁰⁶ to support common-law tort actions or market-based incentive systems for environmental protection,²⁰⁷ both putatively free from "politicians . . . [who] are rewarded for responding to political pressure groups."²⁰⁸ Although I doubt whether free market environmentalism is sufficiently "free" from politics to claim an autonomous intellectual

process that skews policy toward whichever special-interests are politically active rather than toward a more reflective conception of good "public" policy. See DANIEL A. FARBER & PHILIP P. FRICKEY, LAW AND PUBLIC CHOICE 15 (1991) ("[t]he basic assumption is that taxes, subsidies, regulations, and other political instruments are used to raise the welfare of more influential pressure groups") (quoting Becker, *A Theory of Competition Among Pressure Groups for Political Influence*, 98 Q.J. ECON. 371, 371 (1983)).

205. Broadly speaking, "public choice" theories of politics use economic methodologies to study political institutions. See FARBER & FRICKEY, *supra* note 204, at 12-13. To a large extent, the economic theories of group formation that animate interest-group theory also play a central role in public choice economics, leading at least two influential scholars to categorize interest group theory as part of public choice. *Id.* at 12-13 ("Under our definition, interest group theory is part of public choice . . . [even though under] some other definitions . . . the subject of interest groups is not part of public choice . . ."). To the extent that interest group theory and public choice theory are different, public choice would be the more inclusive theory that considers such other economic aspects of politics as "cycling" and the arbitrariness of political outcomes, see William N. Eskridge, Jr., *Politics Without Romance: Implications of Public Choice Theory for Statutory Interpretation*, 74 VA. L. REV. 275, 283 (1988) ("One branch of public choice theory examines legislation and voting as a game in which rational behavior by the game players yields unhappy results for the group as a whole."), and the influence of procedural mechanisms on public goods legislation, *id.* at 291 (procedural obstacles for weak-demand patterns from which public-benefit laws usually emerge in contrast to lack of procedural obstacles to consensual demand patterns that bring concentrated benefits and dispersed costs). A "fuller" public choice theory, however, produces even more skepticism about the ability of political processes to produce good public policy than does interest-group theory alone. See generally James Buchanan, *Politics Without Romance: A Sketch of Positive Public Choice Theory and Its Normative Implications*, in *THE THEORY OF PUBLIC CHOICE—II* (J. Buchanan & R. Tollison eds. 1984).

206. See Terry L. Anderson & Donald R. Leal, *Free Market Versus Political Environmentalism*, 15 HARV. J.L. & PUB. POL'Y 297, 303 (1992) ("[f]ree market environmentalism stresses the importance of well-specified property rights as the proper mechanism to provide the incentive for entrepreneurs acting on specific time and space information").

207. *Id.* at 304 ("The free market environmentalist approach to this problem [of overfishing, or other commons-related environmental problems] would establish property rights through individual transferable quotas . . . [that] give each fisherman a right to a proportion of the catch, thereby eliminating the incentive to over-fish the resource. . . . Free market environmentalism can also solve pollution problems through common law tort remedies if property rights are established and polluters can be identified").

208. Terry L. Anderson & Donald R. Leal, *Free Market Versus Political Environmentalism*, 15 HARV. J.L. & PUB. POL'Y 297, 302 (1992) (citing ANTHONY C. FISHER, RESOURCE AND ENVIRONMENTAL ECONOMICS 54 (1981) ("We have already abandoned the assumption of a complete set of competitive markets . . . [But there is also] the question of the planner's motivation to behave in the way assumed in our models, to allocate resource[s] efficiently . . ."); Emery N. Castle, *The Market Mechanism, Externalities, and Land Economics*, 47 J. FARM ECON. 542, 552 (1965) ("[m]arket 'failure' in some abstract sense does not mean that a nonmarket [governmental] alternative will not also fail in the same or in some other abstract sense").

foundation,²⁰⁹ its proponents certainly make a valid point in arguing that environmental reform proposals cannot be fully evaluated without considering their political dimensions.

A. *Accounting for the Current Shape of Environmental Law: Pluralism, Public Choice, and Positive Political Theory*

The attractiveness of policy reform stems in large part from the fact that our current system of environmental law increasingly resembles a Rube Goldberg machine so built to accommodate its own political assumptions that it can barely keep up with the moral and technical challenges in the field. Consider, for example, the effects that shifting theories of political pluralism and agency capture have had on the texture of environmental law. In the late 1960s and early 1970s, one of the dominant theories of politics centered around an optimistic brand of pluralism, that legislatures (and federal agencies) would produce coherent public policy after considering the interests of all competing interest groups.²¹⁰ This image of politics spawned the conviction that there existed broad but discernible public purposes in environmental statutes,²¹¹ that the newly created EPA would effectuate these purposes even though it was delegated extraordinarily broad implementation discretion,²¹² and that judicial

209. See Krier, *supra* note 146, at 342-43 (questioning why the "very evils of government about which [free market environmentalists] complain" won't distort the political process necessary to establish marketable emission trading schemes or other forms of environmentally-oriented markets); Michael C. Blumm, *The Fallacies of Free Market Environmentalism*, 15 HARV. J.L. & PUB. POL'Y 371, 381 (1992) ("marketable pollution permits, for example, 'still require a political determination of the level of pollution that will be allowed'"). Although not yet argued by many free-market environmentalists, the point I develop in text *infra* accompanying notes 259-66 may provide a partial solution to the conundrum that poorly functioning political institutions would invariably distort any politically-established markets for environmental protection: if legislators were to establish market-based systems during "republican moments" when public-regarding legislative behavior tends to triumph over special-interest-regarding behavior, the resulting markets might be expected to function in more of a public-regarding fashion than interest-group theory otherwise predicts.

210. See Robert Glicksman & Christopher H. Schroeder, *EPA and the Courts: Twenty Years of Law and Politics*, 54 L. & CONTEMP. PROBS. 249, 264 (1991) ("[i]n the early years of EPA, an optimistic brand of pluralism was the reigning political theory in the United States . . . indicating that the interests of competing groups could be melded together in a coherent fashion to produce moderate, conflict reducing, public policy").

211. See, e.g., *Union Electric Co. v. EPA*, 427 U.S. 246, 268-69 (1975) (relying upon Clean Air Act's underlying objective of technology-forcing to allow EPA to consider questions of feasibility in approving state implementation plans); *Portland Cement Ass'n v. Ruckelshaus*, 486 F.2d 375, 383 n.36 (D.C. Cir. 1973) ("courts should endeavor to give statutory language that meaning that nurtures the policies underlying legislation . . . when circumstances not plainly covered by the terms of the statute are subsumed by the underlying policies to which Congress was committed") (quoting Justice Harlan); *International Harvester Co. v. Ruckelshaus*, 478 F.2d 615, 648 (D.C. Cir. 1973) ("[t]he court must seek to discern and reconstruct what the legislature that enacted the statute would have contemplated for the court's action if it could have been able to foresee the precise situation").

212. The notion that federal agencies should creatively and purposively accommodate environmental interests, were such interests only brought to the agencies' attention, was one of the guiding premises of the environmental-impact-statement requirement of the National Environmental Policy Act of 1969, 42 U.S.C. § 4332(C)(i) (1988). See Joseph L. Sax, *The (Unhappy) Truth About NEPA*, 26 OKLA. L. REV. 239,

review of EPA decisions should ensure that all affected interest groups were given adequate opportunities to participate meaningfully in agency decision-making.²¹³

Yet already by the mid-1970s, the shape of environmental law began to change in reaction to a competing, more pessimistic brand of pluralism that took agency capture as its central concern. This theory of politics traced its intellectual pedigree to Mancur Olson's economic theory of collective action.²¹⁴ Olson postulated that large groups of individuals, each of whom stood only to gain fairly small marginal benefits from governmental action (say, citizens who would enjoy somewhat cleaner air), were at an inherent and significant political disadvantage relative to smaller groups of individuals, each of whom stood to lose fairly significant resources from governmental action (say, polluting sources who would bear the immediate costs of strong anti-pollution requirements).²¹⁵ When applied to environmental decisionmaking, the logic of collective action engendered fear that industry would dominate either congressional politics or the administrative processes through which environmental statutes are implemented.²¹⁶ Troubled by the possibilities of agency capture, Congress turned to increasingly specific statutory provisions in environmental legislation²¹⁷ and to the use of agency-forcing devices such

240 (1973) ("NEPA's obvious, if unstated, assumption was that by requiring the agencies to explore, consider, and publicly describe the adverse environmental effects of their programs, those programs would undergo revision in favor of less environmentally damaging activities"). Cf. *Environmental Defense Fund v. Ruckelshaus*, 439 F.2d 584, 598 (D.C. Cir. 1971) (in the context of providing hearings on pesticide cancellations, "[w]hen administrators provide a framework for principled decision-making, the result will . . . enhanc[e] the integrity of the administrative process").

213. The optimistic brand of pluralism explains in particular the tendency of courts of appeals, and especially the tendency of the District of Columbia Circuit, to emphasize in the early 1970s, "meaningful" access of affected groups to agency decisionmakers. See, e.g., *NRDC v. NRC*, 547 F.2d 633 (D.C. Cir. 1976) (requiring agency to engage in a "genuine dialogue" with interest persons); *Ethyl Corp. v. EPA*, 541 F.2d 1, 66-68 (D.C. Cir. 1976) (Bazelon, J.) (emphasizing importance of procedures to ensure participation by affected groups in agency decisionmaking). The Supreme Court in 1978 cabined this practice to the extent it required procedures not provided by statute or agency rules. See *Vermont Yankee Nuclear Power Corp. v. NRDC*, 435 U.S. 519 (1978).

214. MANCUR OLSON, JR., *THE LOGIC OF COLLECTIVE ACTION: PUBLIC GOODS AND THE THEORY OF GROUPS* (1965).

215. *Id.* See FARBER & FRICKEY, *supra* note 204, at 23 ("Olson pointed out that political action generally benefits large groups. For example, everyone presumably benefits from improved national security. But any single person's efforts to protect national security normally can have only an infinitesimal effect. Hence, a rational person will try to 'free ride' on the efforts of others . . .").

216. See Daniel A. Farber, *Politics and Procedure in Environmental Law*, 8 J.L. ECON. & ORG. 59, 60 (1992) ("[t]he two basic predictions are that environmental groups will not organize effectively and that environmental statutes will not be passed").

217. Reauthorized versions of RCRA and CERCLA reflect congressional attempts to restrict EPA discretion by tightening statutory provisions. See, e.g., H.R. REP. NO. 253, 99th Cong., 1st Sess., pt. 1, at 278-79 (1985), *reprinted in* 1986 U.S.C.C.A.N. 2953-54 (anticipating abuses of discretion by EPA); H.R. REP. NO. 198, 98th Cong., 1st Sess., pt. 1, at 38 (1983), *reprinted in* 1984 U.S.C.C.A.N. 5597 (statutory amendment prohibits Administrator from attempting to circumvent Committee's intent to restrict land disposal). See generally Sidney A. Shapiro & Robert L. Glicksman, *Congress, the Supreme Court, and the Quiet Revolution in Administrative Law*, 1988 DUKE L.J. 819, 824 ("Congress has shifted from the discretionary model of legislation to alternative models that give less discretion to the administrative agencies").

as statutory deadlines²¹⁸ and statutorily defined "default" rules that took effect in the absence of agency action.²¹⁹ It remained unclear, however, whether Congress could itself be free of the distortions predicted by Mancur Olson's theory. Mindful perhaps of the implications of political theory, there followed something of a reversal in judicial review of environmental decisionmaking, with courts now less confident of discernible legislative purposes to guide statutory interpretation²²⁰ and somewhat more willing to subject agency decisions to "hard look" review as a check against arbitrary action.²²¹

This hardly ended the ways in which theories of politics affected the features and assumptions of environmental law. By the early 1980s, there emerged a competing theory of capture based on the premise that environmentalists had become power "elites" who could, by manipulating the media, key congressional committees, and agency staff (what classical political economists refer to as "iron triangles" or "subgovernments"),²²² empower themselves at the expense of sound environmental policy.²²³ This theory, which Professor Sidney Shapiro terms "new class" capture,²²⁴ provided much of the ideologi-

218. See Shapiro & Glicksman, *supra* note 217, at 827 (Congress sets deadlines for EPA action because "[i]t doesn't trust [the] EPA" (quoting ENVTL. & ENERGY STUDY INST. & ENVTL. L. INST., STATUTORY DEADLINES IN ENVIRONMENTAL LEGISLATION: NECESSARY BUT NEEDED IMPROVEMENT iii, 41 (1985))).

219. See, e.g., 42 U.S.C. § 6924(d)(1) (1988) (under RCRA, EPA has up to 32 months to determine that prohibiting the land disposal of wastes is not necessary for environmental protection, but if the agency fails to make that determination on time, the statutory prohibition goes into effect immediately). See generally Shapiro & Glicksman, *supra* note 217, at 839 ("in a series of provisions sometimes called 'hammers,' Congress has given the EPA a certain period of time to regulate; if at the end of the specified time the agency has failed to act, the 'hammer' falls, and the regulatory result set forth in the statute automatically goes into effect").

220. See *Chevron, U.S.A., Inc. v. NRDC*, 467 U.S. 837 (1984) (courts misperceive their role when they search for statutory "purpose" to answer questions that are not precisely addressed in legislation).

221. See *Portland Cement Ass'n v. Ruckelshaus*, 486 F.2d 375, 384 n. 39 (D.C. Cir. 1973) ("it cannot be forgotten that EPA is a regulatory agency and in the past in Washington almost all regulatory agencies have eventually come under the control of those that they are charged with regulating") (quoting 1972 National Wildlife Federal Conservation Report); *International Harvester Co. v. Ruckelshaus*, 478 F.2d 615, 633 (D.C. Cir. 1973) (courts should supervise agency action because a "court, isolated as it is from political pressures, . . . would be a more suitable forum for review than even the Congress"); *Kennecott Copper Corp. v. EPA*, 462 F.2d 846, 849 (D.C. Cir. 1972) (requiring EPA to provide detailed explanation of its reasoning); Glicksman & Schroeder, *supra* note 210, at 220 ("Courts began to view agency proceedings with suspicion, and the bureaucracies' assertions that they were watching out for the interest of the disorganized public were no longer taken as dispositive.").

222. See, e.g., Hugh Heclo, *Issue Networks and the Executive Establishment*, in *THE NEW AMERICAN POLITICAL SYSTEM* 87 (Anthony King, ed. 1979); J. LEIPER FREEMAN, *THE POLITICAL PROCESS* 11 (1955).

223. See, e.g., Paul H. Weaver, *Regulation, Social Policy, and Class Conflict*, 50 PUB. INTEREST 45, 60 (1978) ("With each passing year it becomes clearer that the real animus of the new class is not so much against business or technology as against the liberal values served by corporate capitalism and the benefits these institutions provide to the broad mass of the American people . . .") (cited in Sidney A. Shapiro & Donald T. Hornstein, *The Counter-Reformation of Administrative Law* (forthcoming 1993) (manuscript at 37, on file with author)).

224. See Shapiro & Hornstein, *supra* note 223, at 37 ("Near the end of the 1970's, academic critics of social regulation argued that a new coalition of interests—the "new class"—had captured social regulation.").

cal foundation for efforts by the Reagan and Bush Administrations to expand White House involvement in environmental policymaking.²²⁵ And, as environmental law adjusted to such new regulatory initiatives as regulatory review by the Office of Management and Budget (OMB) through Executive Orders 12,291 and 12,498,²²⁶ there were signs of even greater complexity as Congress responded with tighter statutory deadlines,²²⁷ direct limitations on OMB,²²⁸ and increasing use of appropriations bills to effectuate substantive changes in environmental policy.²²⁹ The cumulative result of these partisan politics and theoretically grounded misgivings was a byzantine system of environmental law, which reflected in large part the battleground for inter-agency political warfare.

Of course, it is possible that there is method to the madness, or so claim the proponents of positive political theory (PPT)—perhaps the newest theory of politics to attempt an explanation of environmental law.²³⁰ The central methodology of PPT is game theory and the central concept is that legislators are quite aware of the slippage which can occur in implementing environmental laws and take appropriate proactive measures to maximize their

225. See JONATHAN LASH ET AL., *A SEASON OF SPOILS* xiii, 6 (1984).

226. Exec. Order No. 12,291, 3 C.F.R. 127 (1981), *reprinted in* 5 U.S.C. §601nt (1989), requires executive-branch agencies to assess the benefits and costs of proposed rules and to regulate ("to the extent permitted by law") only when benefits exceed cost. Exec. Order No. 12,498, *reprinted in* 5 U.S.C. § 601 (1989 Supp.), requires regulatory planning by agencies in a regulatory agenda as well as clearance through the Office of Management and Budget of activities that might precede rulemaking.

227. See, e.g., 132 CONG. REC. S6286 (daily ed. May 21, 1986) (statement of Sen. Durenberger) (Congress has used deadlines to prevent OMB from holding up the issuance of EPA regulations).

228. See Jeffrey H. Howard & Linda E. Benfield, *Rulemaking in the Shadows: The Rise of OMB and Cost-Benefit Analysis in Environmental Decisionmaking*, 16 COLUM. J. ENVTL. L. 143, 179-80 (1991) (congressional efforts to require disclosure of *ex parte* contacts between interest groups and OMB). See also GAO *Criticizes Budget Office Theory on 'Risk-Risk' Analysis for OSHA Rule*, 16 Chem. Reg. Rep. (BNA) No. 16, at 738 (July 17, 1992) (Senate legislation to cut funding for Competitiveness Council); *House Votes to Cut Funds of Quayle Council*, 23 Env't Rep. (BNA) No. 11, at 776 (July 19, 1992) (House votes to cut funding for Competitiveness Council).

229. See *Seattle Audubon Society v. U.S. Forest Service*, No. 90-1596, 60 U.S.L.W. 4273 (U.S. Mar. 24, 1992) ("Congress may amend substantive law in an appropriations statute, so long as it does so clearly"); *Reilly Favors Return to 1987 Manual, Cites Emerging Consensus on Delineation*, 23 Env't Rep. (BNA) No. 17, at 1252 (Aug. 21, 1992) (appropriations bill blocks EPA from continuing immediately with certain drinking water regulations); *Senate Version of EPA Appropriation Bill May Block Further Dirty Water Regulation*, 23 Env't Rep. (BNA) No. 17, at 1260 (Aug. 21, 1992) (appropriations bill required Corps of Engineers to use the 1987 "wetlands manual" to prevent substantive changes that had been made in an updated manual).

230. In their introduction to a recent symposium on positive political theory, Professors Daniel Farber and Philip Frickey define positive political theory as the non-normative application of rational choice theory (which assumes that individuals seek to optimize their preferences about outcomes) to such institutional arrangements in politics as bicameralism, committee work, delegation to administrative agencies, and judicial review of agency decisions. Daniel A. Farber & Philip P. Frickey, *Foreward: Positive Political Theory in the Nineties*, 80 GEO. L.J. 457, 462-63 (1992). Using this definition, PPT is distinct from public choice theory, which is typically viewed as more normative, or disapproving, than PPT and which focuses more on the motivation of individual legislators to get reelected rather than the motivation of legislators to optimize their preferences (both self-serving and altruistic) through attention to institutional arrangements. *Id.* at 458-63.

positions.²³¹ Under PPT methodology, for example, there is room for the pessimistic idea that legislators will seek credit for supporting an environmental statute with apparently sweeping "goals" or "rights," knowing that there are sufficiently difficult implementation problems which will narrow the statute's real-life sweep.²³² But PPT methodology can also support the more hopeful idea that a statute's legislative coalition, mindful of implementation's importance, will seek to "hotwire" administrative procedures in a way that effectuates the winning coalition's substantive ends and protects the legislative "deal" from the predations of agency capture (whether classical or new class capture).²³³ Even in those instances where statutes contain implementation processes that seem at odds with substantive commitments, PPT can support the neutral idea that this was simply the best mix of substance and procedure which the winning coalition could muster, without necessarily implying the handiwork of unprincipled politicians seeking only to "game" the system for electoral advantage.²³⁴ In whichever form it takes, PPT seeks to provide insight into the link between substance and procedure in environmental law, a linkage that should not be ignored in evaluating proposals for environmental law reform.

B. *Political Theory and Environmental Law Reform: The "Totalitarian" and "Republican Moment" Arguments*

Although recent scholarship has begun to explore political theories that can explain and evaluate the shape of environmental law, there has been far less effort made to analyze the principal substantive paradigms offered for environmental law reform—risk oriented and cause-oriented approaches—in light of

231. Although this is necessarily a general and oversimplified description, it is important to recognize that PPT need not subscribe to the view that legislators are unduly influenced by special interests. It can account for altruistic or "Burkean" legislators who come by their conceptions of the public good despite the asymmetrical power of special interests. See Michael E. Levine & Jennifer L. Forrence, *Regulatory Capture, Public Interest, and the Public Agenda: Toward a Synthesis*, 6 J.L. ECON. & ORG. 167, 174-75 & n.16 (1990) (PPT can accommodate the notion that public officials are motivated in whole or in part by the other-regarding behavior described by Edmund Burke in his "Speech to the Electors of Bristol"). Once conceptualizing a position, however, PPT hypothesizes that public officials "game" the system by making rational choices to maximize these positions and that politics can be described and analyzed by models operating on this assumption. See *id.* at 183-85 (proposing a model to predict general-interest regulation in the presence of "slack," a concept akin to the "slippage" described in text).

232. See Peter H. Aranson et al., *A Theory of Legislative Delegation*, 68 CORNELL L. REV. 1, 56-57 (1982) (opportunities for legislators to shift both credit and blame for policy choices to agencies).

233. See Matthew D. McCubbins et al., *Structure and Process, Politics and Policy: Administrative Arrangements and the Political Control of Agencies*, 75 VA. L. REV. 431, 432-33 (1989) ("The purpose of this Article is to contribute to the positive political theory of the structure and process of administrative agencies [We hypothesize that] effective political control of an agency requires ex ante constraints on the agency").

234. See Terry M. Moe, *Political Institutions: The Neglected Side of the Story*, 6 J.L. ECON. & ORG. 213, 230 (1990).

political theory. In this Section, I seek to identify some of those connections that have been, or could be, made.

Risk-oriented reform, which is typically defended on the grounds of economic rationality,²³⁵ is also defended (albeit to a lesser extent) as a politically superior mechanism for decisionmaking. Two types of claims are made and appear to be based on distinct theories of politics. The first claim argues from civic republicanism—the constitutionally-based view that government decisions should be made after public-regarding deliberation reflecting the values of all members of society²³⁶—that Congress or bureaucratic organizations can better identify and debate normative issues when environmental policy is framed as a problem of risk prioritizing.²³⁷ In the spirit of this tradition, Professor John Applegate recently suggested that EPA periodically submit to Congress a risk-based regulatory agenda which “could be the occasion for a thorough airing of the agency’s direction and priorities, both internal and external, before the public or its authoritative representatives.”²³⁸ In a similar spirit, EPA itself has sponsored statewide and citywide planning efforts in which participants deliberate and develop more localized environmental goals or strategies that reflect a mix of scientifically-based risk assessments and politically perceived environmental priorities.²³⁹ In both cases, the priority-setting exercise is viewed as more democratic and deliberative than the current system, which is presented either as blindly administering statutorily-

235. See Hornstein, *supra* note 7, at 577 (risk-reduction approaches are based on a conception of rational decisionmaking which “mimics . . . the comparative methodology of expected utility theory, the dominant approach in economics and social science generally to making decisions under conditions of uncertainty or risk”).

236. Civic republicanism can be defined conceptually as a theory of politics based on civic virtue, “that is, on the willingness of individuals to sacrifice private interests to the common good,” FARBER & FRICKEY, *supra* note 204, at 43. It operates as a model of government that rejects “the pluralist assertion that government can, at best, implement deals that divide political spoils according to the pre-political preferences of interest groups. Instead, it argues that government’s primary responsibility is to enable the citizenry to deliberate about altering preferences and to reach consensus on the common good.” Mark Seidenfeld, *A Civic Republican Justification for the Bureaucratic State*, 105 HARV. L. REV. 1511, 1512 (1992) (citing for similar definitions Frank Michelman, *Law’s Republic*, 97 YALE L.J. 1493, 1513 (1988) and Cass R. Sunstein, *Beyond the Republican Revival*, 97 YALE L.J. 1539, 1548-49 (1988)).

237. See, e.g., Applegate, *supra* note 26, at 330 (proposal to have EPA present a risk-based regulatory agenda to Congress “would involve Congress in setting the overall direction of the agency . . . openly managed, the regulatory agenda could be the occasion for a thorough airing of the agency’s direction and priorities, both internal and external, before the public or its authoritative representatives”); Stewart, *supra* note 43, at 10,208 (making a “democratic case” for risk-based market incentives in which Congress would focus on the important questions of which risks, and how much risk, to regulate).

238. Applegate, *supra* note 26, at 330.

239. See OFFICE OF POLICY, PLANNING AND EVALUATION, U.S. ENVTL. PROTECTION AGENCY, AN OVERVIEW OF RISK-BASED PRIORITY SETTING AT EPA, paper commissioned by the Center for Risk Management, Resources for the Future (Nov. 15-17, 1992) (unpublished manuscript, on file with author) (describing efforts among 19 state and local public bodies to develop local risk priorities); 16 COMP. RISK BULL. 1, 6-8 (Sept. 1992) (describing efforts at the local level to develop public “referenda” on risk).

based environmental requirements, without any integrative strategy or, alternatively, as making the inevitable trade-offs in technocratic and politically invisible decisions.

The second claim is a form of "new class" capture theory. It argues that the scientific integrity of decisions based on risk-reduction will save us from the demagoguery of environmental elites, who otherwise would highjack environmental policymaking through the creation of spurious "perceptions" of risk among a gullible public. Professor Frank Cross most recently articulated this claim in an essay which castigates those who "attack probabilistic risk perspectives" and would instead base public decisions on more manipulable "risk perceptions."²⁴⁰ Professor Cross makes clear that it is the fear of political totalitarianism which drives his faith in risk-based decisionmaking. After a nod toward the potential legitimacy of public "perceptions" and "values" in a democracy,²⁴¹ he argues that those who champion public perceptions become "bedfellows" with the Nazis "[who convinced] the German people of the scientific lie of Aryan superiority,"²⁴² the Communists who insisted on Lysenkoism,²⁴³ and racists who perpetuate the myth of statistically unfounded racial stereotypes.²⁴⁴ With no apparent sense of irony, Cross quotes anthropologist Mary Douglas for the proposition that people seeking power often couch their arguments in "moral" rather than "scientific" language that "equate[s] risk with sin."²⁴⁵ Cross's major point is that science plays "the important political function in the modern liberal-democratic state" of combatting "the ability of empowered elites to command action based on arbitrary or self-serving motives."²⁴⁶

Granting that there are grains of truth in both political claims for risk reduction, it remains to be seen whether these combine into a theoretically

240. Frank B. Cross, *The Risk of Reliance on Perceived Risk*, 3 RISK: ISSUES IN HEALTH & SAFETY 59, 60, 68 (1992). Cross argues that "reliance on risk perception is probably a natural consequence of post-modernist thought, which questions the very existence of such concepts as truth and objective reality." *Id.* at 60.

241. *Id.* at 69 ("The above criticism of reliance on risk perception does not imply that democratic governments should ignore public values and perceptions of risk *entirely*. Such a contention would be hopelessly naive in a democracy.") (emphasis added). Cross does acknowledge that "[u]nquestioning deference to the conclusions of scientists is also potentially counterproductive" and that "[h]istory shows that perceptions or opinions of government scientists, if not science itself, can be controlled or manipulated by authoritarians much like the perceptions of the public." *Id.* at 69-70. At times Cross seems only to be making the fairly modest point that decisionmaking should not "defer automatically or even presumptively to public perceptions of risk, unchecked by scientific data." *Id.* at 70. But the overall tone of his essay points more accurately to his broader conclusion that "[t]he search for objective truth through the scientific method offers a far sounder value formation than does government reliance on public perceptions of risk." *Id.*

242. *Id.* at 64.

243. *Id.* at 64, 68, 70.

244. *Id.* at 64 (quoting Eduardo Galeano, *Language, Lies and Latin Democracy*, HARPER'S, Feb. 1990, at 21).

245. *Id.* at 67 (citing Mary Douglas, *Risk as a Forensic Device*, DAEDALUS, Fall 1990, at 13-16).

246. *Id.* at 68 (citing YARON EZRAHI, *THE DESCENT OF ICARUS* 195 (1990)).

coherent position. There is an immediately apparent contradiction: the political argument from science, that risk-based policymaking avoids intuitive decisions by an unsophisticated electorate, appears to leave relatively little breathing room for the participatory and value-oriented reflection promised by the civic republicans. Although a strained reconciliation might be imagined, in which formal risk assessments merely serve as starting points for less-scientifically-based public deliberations about risk, one wonders whether such a charitable attitude toward discourse will be exhibited by those who see in different risk perspectives only would-be Nazis and Communists.²⁴⁷ Even were the two political claims somehow to coexist, it is unclear whether the resulting mix of science and public values portends all that much of a "reform" from the existing political dialogue on risk.

Apart from this internal tension, both political claims for risk reduction share a more significant defect—they do not seriously account for the distortions in political discourse that can be introduced by well-organized, well-financed interest groups. The danger is that risk-based reforms will exacerbate the unequal power that special interests may already have over general (public) interests. This can occur for two reasons. First, because risk-based decision-making is extraordinarily information intensive, the economics of information²⁴⁸ offers strategic advantages to special interests in producing or otherwise influencing the processing of information.²⁴⁹ Second, the often drawn-out process of making risk-based decisions is more accessible to those, such as special interests, that can consistently deploy technically competent scientists, economists, attorneys, and public relations firms to represent their interests at all important decisional points.²⁵⁰

247. See, e.g., EDITH EFRON, *THE APOCALYPTICS: HOW ENVIRONMENTAL POLITICS CONTROLS WHAT WE KNOW ABOUT CANCER* 9 (1984) ("I bumped into evidence of such hostility to the objective disciplines of science, evidence of so aggressive a rejection of facts and logic, that I could scarcely credit my senses.").

248. Because information is a "public good" that cannot easily be controlled for profit by its producer, there are no market incentives in the private sector to produce good information. See FRITZ MACHLUP, *THE PRODUCTION AND DISTRIBUTION OF KNOWLEDGE IN THE UNITED STATES* 28 (1962) ("The production of knowledge is, for the greater part, not guided by the market mechanism."); Kenneth Arrow, *Economic Welfare and the Allocation of Resources for Invention*, in NATIONAL BUREAU OF ECON. RESEARCH, *THE RATE AND DIRECTION OF INVENTIVE ACTIVITY* 609, 615 (1962) (the market for good information is further reduced because purchasers do not know its value until it has been produced, thereby reducing incentives for investment in information-producing enterprises). See also Mary L. Lyndon, *Information Economics and Chemical Toxicity: Designing Laws to Produce and Use Data*, 87 MICH. L. REV. 1795, 1801-05 (1989) (discussing economic disincentives to data production).

249. Because there is no active market for good information, government regulators are peculiarly dependent on the regulated firms themselves for data generation. This creates numerous incentives for firms to choose testing procedures most likely to shed favorable light on the substances they wish to market. See, e.g., Paul Portney, *Toxic Substance Policy and the Protection of Human Health*, in RESOURCES FOR THE FUTURE, *CURRENT ISSUES IN U.S. ENVIRONMENTAL POLICY* 138 (Paul R. Portney ed., 1978); Lyndon, *supra* note 248, at 1804.

250. See Clayton P. Gillette & James E. Krier, *Risk, Courts and Agencies*, 138 U. PA. L. REV. 1027, 1071-72 (1990) (discussing how organized special interests can manipulate the "rationalities" of efficiency or expertise in such a way as to give them advantages in the regulatory process).

It seems particularly dangerous for proponents of risk-reduction, who so freely use economic methodology to justify their substantive conceptualizations of risk,²⁵¹ to all but ignore the interest group distortions that economic methodology predicts in politics. Because there is so much room for discretion in deciding which aspects of risk to measure in evaluating environmental problems,²⁵² risk-based decisionmaking can itself become a device by which politically powerful groups can effectuate their interests—now clothed as merely the objective determinations of “science”—at the expense of less powerful groups. The point can be made more concrete by considering Professor Cross’s allusion to the usefulness of science in unmasking statistically unfounded racial stereotypes.²⁵³ Apart from the troubling inference in Cross’s argument that in a science-based world stereotypes may be less objectionable when they are statistically defensible,²⁵⁴ Cross makes the key assumption that science will always be deployed neutrally and objectively to unmask the statistical falsity of racial prejudice. In fact, environmental risk assessments are often structured to downplay the distributional aspects of risk in general and to ignore racial and ethnic dimensions of environmental problems in particular.²⁵⁵ On the basis of “aggregate” risk assessments, for example, policy has been set based on scientific assurances of low health risks from toxic chemicals or solid- and hazardous-waste facilities,²⁵⁶ only to have those

251. See Hornstein, *supra* note 7, at 579 & nn.78-79 (risk-reduction proponents use the economic imperative of “transitivity” on which to base the claim that their methodology offers a “rational” approach to risk).

252. To illustrate the point with the range of “endpoints” involved in pesticide regulation, see *infra* notes 436-43. For the general proposition that the decision on which end points to focus a risk assessment is itself a value-laden choice, see Dale Whittington & Duncan MacRea, Jr., *The Issue of Standing in Cost-Benefit Analysis*, 4 J. POL’Y ANALYSIS & MGMT. 665 (1986) (insufficient attention has been paid to which benefits, and whose benefits, should be counted in cost-benefit analysis). Of course, once the risk assessment focuses on particular end points, there is also room for considerable discretion in deciding how to measure the probabilities and magnitude of expected losses. See, e.g., Carl F. Cranor, *Scientific Conventions, Ethics, and Legal Institutions*, 1 RISK: ISSUES IN HEALTH & SAFETY 155, 157 (1990) (risk assessments that vary in only one variable can produce estimates which vary by a million-fold: a level of indefiniteness akin to “not knowing whether you have enough money to buy a cup of coffee or pay off the national debt”); Howard Latin, *Good Science, Bad Regulation, and Toxic Risk Assessment*, 5 YALE J. ON REG. 89, 92-95 (1988) (arbitrary judgment calls in the experts’ estimation of the carcinogenicity of airborne benzene).

253. “In a far more distressing example, there is widespread public perception that young black males are exceptionally dangerous and violence-prone. Yet statistical data from the Federal Bureau of Investigation and other sources indicates that young black males may be no more violence-prone than other races and that the perception may be due to bias in whom is arrested.” Cross, *supra* note 240, at 65.

254. Although being prejudged by an “inaccurate” stereotype will be especially unjust to the victim, the larger problem with stereotypes is not that they lack statistical validity, but that they are used to prejudice an individual based on “mean” or “median” characteristics of the group to which the individual belongs.

255. Lazarus, *supra* note 35, at 87 n.265 (There has “never been a consistent EPA policy to address equity issues with respect to racial and income groups”) (quoting OFFICE OF POLICY, PLANNING AND EVALUATION, U.S. EPA, ENVIRONMENTAL EQUITY—REDUCING RISK FOR ALL COMMUNITIES—REPORT TO THE ADMINISTRATOR FROM THE EPA ENVIRONMENTAL EQUITY WORKSHOP 32 (Draft Feb. 1992)) [hereinafter DRAFT EPA ENVIRONMENTAL EQUITY REPORT].

256. *Id.* at 23-26.

assurances themselves later “unmasked” as having ignored the disproportionately higher risks faced by members of racial minorities who have waste facilities sited near their neighborhoods²⁵⁷ or who tend to hold the jobs where toxic chemical exposure is relatively high.²⁵⁸ The point is not to discredit science. It is, rather, to underscore that the scientific risk-reduction paradigm does not offer a safe haven from the distorting influences of subtle class- or race-based biases or outright interest group politics.

Even if interest group and public choice theories are overstated or far too simplified (as may well be the case), risk-based decisionmaking may still not mean better environmental politics. This is because environmental law, which *appears* to benefit the many at the expense of the few, is often cited as “Exhibit No. 1” in the case for public-interest-regarding political discourse and action. As Professor Daniel Farber recently observed, according to special-interest theory, there shouldn’t be any environmental law.²⁵⁹ Yet, before civic

257. See, e.g., ROBERT BULLARD, *DUMPING IN DIXIE: RACE, CLASS, AND ENVIRONMENTAL QUALITY* 31 (1990) (two large hazardous waste landfills, representing more than one-third of the licensed hazardous waste landfill capacity in the United States, are in towns that are 78.9% and 93% black); UNITED CHURCH OF CHRIST COMMISSION FOR RACIAL JUSTICE, *TOXIC WASTES AND RACE IN THE UNITED STATES* xiii-xiv (1987) (“[t]hree out of every five Black and Hispanic Americans lived in communities with uncontrolled toxic waste sites”); U.S. GENERAL ACCOUNTING OFFICE, *SITING OF HAZARDOUS WASTE LANDFILLS AND THEIR CORRELATION WITH RACIAL AND ECONOMIC STATUS OF SURROUNDING COMMUNITIES* 3 (1983) (“Blacks make up the majority of the population in three of the four communities where the landfills are located”). But see Jay Hamilton, *Politics and Social Cost: Hazardous Waste Facilities in a Truly Coasian Work* 24 (Duke University, Institute for Policy Sciences and Public Affairs Working Paper) (June 1991) (unpublished manuscript, on file with author) (challenging conclusion of United Church of Christ study and finding that “controlling for other factors [in particular what Hamilton calls “collective action potential” measured by voter turnout among the population] race is not a statistically significant factor in the expansion selection process”). But see Lazarus, *supra* note 35, at 21-29 (reporting on methodological challenges to studies alleging environmental racism).

258. Although EPA has regulated coke oven emissions based on estimates of carcinogenicity among “median” or “average” workers, 90% of the steelworkers most heavily exposed to carcinogenic emissions are nonwhite and have been found to suffer from regulatory cancers at a rate eight times greater than would normally be expected. See Lazarus, *supra* note 35, at 28 (quoting DRAFT EPA ENVIRONMENTAL EQUITY REPORT, *supra* note 255, at 20). A similar racial bias in the structure of risk assessments can be found in EPA’s failure to consider that nonwhites often eat fish in which carcinogens bioaccumulate at disproportionately higher rates than the population at large and sometimes prepare their food in ways that differ from the general population, such as trimming less fat, and thereby increasing their exposure to contaminants. See Lazarus, *supra* note 35, at 28, n. 74 (citing DRAFT EPA ENVIRONMENTAL EQUITY REPORT, *supra* note 255, at 17-18).

259. “[F]rom the perspective of positive political theory, the puzzle is not that Congress produces public goods such as clean air so inefficiently, but that Congress manages to produce any public goods at all.” Daniel A. Farber, *Politics and Procedure in Environmental Law*, 8 J.L. ECON. & ORG. 59, 59 (1992). Farber criticizes attempts to explain environmental law simply as special-interest legislation designed to mask rent-seeking by regulated industries, *id.* at 62-64, or by “upper-middle-class backpackers,” *id.* at 64-65. Farber persuasively argues that as a general matter, environmental legislation presents an empirical problem for special-interest or public choice theories of politics. *Id.* at 60 (“For example, air pollution legislation benefits millions of people . . . it also imposes heavy costs on concentrated groups of firms. [Special interest] theory predicts that the firms will organize much more effectively than the individuals, and will thereby block the legislation . . . Yet the reality is quite different.”). Despite his general observation, Farber does leave room for the influence of special interest politics on the shape of environmental legislation. *Id.* at 64. I find this reservation more than justified in my analysis of pesticide regulation, see *infra* notes 337-86.

republicans rejoice, there needs to be more attention paid to the mechanisms by which public demand for environmental goods apparently gets translated into legislation.²⁶⁰ Farber borrows from civic republicanism the concept of "republican moments" to explain environmental legislation.²⁶¹ According to this hypothesis, environmental statutes are enacted not during the "normal" political periods that are typically responsive to conventional interest group pressures, but rather during "extraordinary moments" when broad segments of the population become intensely interested in environmental issues, often due to well-publicized environmental "crises" or other attention-getting "symbolic" events.²⁶² During moments such as these, legislative "shirking" diminishes²⁶³ as legislators "find themselves in the spotlight, and their positions shift closer to those of the public at large."²⁶⁴ Although there certainly remain unanswered questions about the political significance of these extraordinary moments,²⁶⁵ a growing body of empirical evidence supports the importance of republican moments to the legislative process in general.²⁶⁶

If Farber's hypothesis is correct, there is a danger that risk reduction may be counterproductive to environmental protection. This is because risk-based conceptualizations of environmental problems tend to downplay the subjective attributes of risk that often underlie the high public salience of environmental issues; indeed, it is to avoid just such "sensationalizations" of "the facts" that

260. See Farber, *supra* note 259, at 65 ("If environmental statutes do in significant part reflect a broad public demand, how does that demand get translated into legislation?").

261. See *id.* at 66, quoting James Pope, *Republican Moments: The Role of Direct Popular Power in the American Constitutional Order*, 139 U. PA. L. REV. 287, 291-93 (1990):

Our history has from the outset been characterized by periodic outbursts of democratic participation and ideological politics. And if history is any indicator, the legal system's response to these "republican moments" may be far more important than its attitude toward interest group politics. The most important transformations in our political order . . . were brought on by republican moments.

262. Farber gives as examples the heightened political activity surrounding the original Earth Day, the Love Canal episode, and the Three Mile Island incident. Farber, *supra* note 259, at 66-67. See also Hornstein, *supra* note 7, at n.67 ("It is well recognized that support for and the shape of environmental legislation often galvanizes in the heat of crisis") (citations omitted).

263. There is support for this proposition in other areas of political activity as well. Political scientists Michael Levine and Jennifer Forrence, writing in the positive political theory tradition, have observed that in periods of heightened public concern, legislative outcomes are pushed in the direction preferred by the median voter. See Michael E. Levine & Jennifer L. Forrence, *Regulatory Capture, Public Interest, and the Public Agenda: Toward a Synthesis*, 6 J.L. ECON. & ORG. 167-98 (1990).

264. Farber, *supra* note 259, at 66.

265. See Thomas S. Ulen, *Comments on Daniel A. Farber, Politics and Procedure in Environmental Law*, 8 J.L. ECON. & ORG. 82, 86-87 (1992) ("Despite its surface plausibility . . . I am not yet sure what counts as a republican moment. Can it arise only at the national level . . . [i]s it conceivable, for example, that one portion of the state of Illinois could experience a republican moment while another did not? . . . What about anti-Semitism in Nazi Germany?"). See *infra* notes 290-386 and accompanying text (finding cautious support for the republican notion idea in pesticide regulation).

266. See Pope, *supra* note 261, at 324-41.

the risk-reduction paradigm is typically defended.²⁶⁷ What seems to have been missed, however, is that any "bad marks" which such volatile political debates earn on the grounds of technical scientificity may be more than offset by "good marks" on the grounds of public-regarding debate which lifts environmental issues out of the business-as-usual influence of special interest politics.²⁶⁸ The mistaken assumption of the civic republican claim for risk reduction is that the public will be as equally focused and motivated to explore its collective preferences for environmental protection during times of dispassionate scientific debate as it is during the "republican moments" that have so often characterized environmental politics. Yet a large body of literature in cognitive psychology predicts that people typically respond to risk more through the use of simplifying heuristics than through the dispassionate statistical methodologies of *Homo economicus*.²⁶⁹ Indeed, it is to just this literature that proponents of risk reduction often point in emphasizing the virtues of scientifically based risk priorities over the priorities of laypersons.²⁷⁰ Again, however, the proponents of risk reduction fail to follow through on their assumptions. If the public is relatively unmoved by the niceties of scientific risk assessments, then a policymaking regime based on such assessments will have stripped itself of one of the energizing political mainsprings that motivates public-regarding debate and that has given environmental politics its public-interest rather than special-interest characteristics. The result will be a political system that enjoys less of the virtues of civic republicanism, rather than more.

Lest a political critique only be leveled at risk-oriented reform, it is worth highlighting that policies proposed under cause-oriented reform often fail to reflect a coherent political theory as well. The National Environmental Policy Act of 1969 (NEPA),²⁷¹ for example, purported to mandate that all federal

267. See, e.g., Cross, *supra* note 240, at 61, 70 ("The real question is the value of reliance on risks as perceived by the general public or on risks as perceived by 'experts' . . . [t]he search for objective truth through the scientific method offers a far sounder value foundation than does government reliance on public perceptions of risk"); EPA SCIENCE ADVISORY BOARD, *supra* note 27, at 4 (urging a cautious shift from priority setting based on problems believed to be significant by the "general public" toward priority setting based more on expert risk rankings); Reilly, *supra* note 25, at 48 (Reilly "betting on" the scientists).

268. See Levine & Forrence, *supra* note 263, at 167-98 (during periods of heightened political interest legislative outcomes are pushed toward the positions of the "median" voter).

269. See, e.g., Paul Slovic, *Perception of Risk*, 236 SCI. 280, 283 (1987) (laypersons may not view risk the same as experts); Amos Tversky & Daniel Kahneman, *Judgment Under Uncertainty: Heuristics and Biases*, in JUDGMENT UNDER UNCERTAINTY 3-20 (Daniel Kahneman et al. eds., 1982) (discussing representativeness, availability, and anchoring heuristics); Hornstein, *supra* note 7, at 606-10 (collecting sources); Gillette & Krier, *supra* note 250, at 1073-80 (collecting sources).

270. See, e.g., MARGARET MAXEY, *MANAGING ENVIRONMENTAL RISKS: WHAT DIFFERENCE DOES ETHICS MAKE* 3 (1990) (public's sentimental aversion to technological risk); AARON WILDAVSKY, *SEARCHING FOR SAFETY* 59 (1988) (public's irrational fear of technology); Peter W. Huber, *Safety and the Second Best: The Hazards of Public Risk Management in the Courts*, 85 COLUM. L. REV. 277, 281 (1985) (public's irrational acceptance of seat belt usage in airplanes which are relatively safe and resistance to seat belt usage in automobiles which are relatively dangerous).

271. 42 U.S.C. §§ 4321-4370b (Supp. 1990).

agencies develop strategies to integrate environmental considerations into the country's "nonenvironmental" programs, with little analysis given to the bureaucratic disincentives that would govern (and eventually would overcome) NEPA's actual implementation success.²⁷² So too, without the use of a common metric such as risk reduction, cause-oriented policymaking may very well court the type of political arbitrariness (or worse) to which Professor Cross alludes, especially when confronted with environmental "solutions" that create benefits for some but costs to others.²⁷³ And to the extent that special interest theory validly describes distortions that can occur in environmental politics, it is difficult to understand the confidence with which proponents of cause-oriented reform speak of a new era of environmental taxes and incentive-based regulations given the special interest "feeding frenzies" that have traditionally plagued the establishment of federal tax policy.²⁷⁴ Nor is it clear why proponents of cause-oriented reform so quickly deride risk-based decisionmaking without considering the possibility that the power of special interests over environmental policymaking may be best kept in check by powerful bureaucratic organizations that can plausibly claim to base their regulatory decisions on sound science.²⁷⁵

To make the foregoing more concrete, I turn now to lessons that may be drawn from the politics of federal pesticide regulation.

C. *Constructing a Positive Political Theory of Pesticide Regulation*

Perhaps the most revealing aspect of pesticide regulation under FIFRA and FFDCA is that its critics seem to see in it two entirely different things. One broad criticism is that the scheme allows for public hysteria over pesticides to displace a more scientific approach. A particularly virulent form of this criticism was foreshadowed in attacks on Rachel Carson as a socially valueless "spinster" who irrationally concerned herself with "cats' deaths from DDT

272. See Sax, *supra* note 212, at 239 ("I think the emphasis on the redemptive quality of procedural reform is about nine parts myth and one part coconut oil). *Id.* at 248 ("[I]f we want to change [bureaucratic] behavior, we must give . . . signals that will register"). But see Matthew McCubbins et al., *Positive and Normative Models of Procedural Rights: An Integrative Approach to Administrative Procedures*, 6 J.L. ECON. & ORG. 307, 318-28 (1990) (special issue) (the proceduralism required by NEPA effectively stopped the nuclear power industry in its tracks).

273. See, e.g., John D. Graham, *The Safety Risks of Proposed Fuel Economy Legislation*, 3 RISK: ISSUES IN HEALTH & SAFETY 95, 106 (1992) (the pollution prevention approach of increasing fuel efficiency can cause significant increased risks of death and serious injury to small car drivers and passengers).

274. See Richard L. Doernberg & Fred S. McChesney, *On the Accelerating Rate and Decreasing Durability of Tax Reform*, 71 MINN. L. REV. 913, 934 (1987) ("The political process of using the specter of taxation to milk private groups for contributions hardly corresponds to the legislative process as taught in eighth-grade civics classes").

275. See, e.g., HOUSE COMM. ON AGRICULTURE, BUSINESS MEETINGS ON FIFRA EXTENSION, PART II, 94th Cong., 1st Sess. 125 (Comm. Print 1975) (statement of Russell Train, EPA Administrator) (EPA attempts need to persuade farm bloc representatives that the Agency used "science" to regulate pesticides and did not act "precipitously or recklessly").

while not caring about the 10,000 people who die daily throughout the world from malnutrition and starvation.”²⁷⁶ Less contemptuous arguments, but still urging the need for more scientific decisionmaking, were launched against EPA for its suspension in 1979 of the herbicide 2,4,5-T,²⁷⁷ for its regulatory actions in 1984 against the nematocide ethylene dibromide (EDB),²⁷⁸ and for its cancellation in 1989 of the growth regulator daminozide (Alar).²⁷⁹ Currently, the argument is reflected in *Les v. Reilly*,²⁸⁰ a case in which the Ninth Circuit recently upheld a literal interpretation of the Delaney Clause in FFDCA Section 109 despite arguments that a zero-risk interpretation of Delaney would be “irrational” because it might preclude the substitution of new pesticides posing “trivial” risks for existing pesticides which pose more significant risks.²⁸¹

On the other hand, there is an equally long tradition of criticizing pesticide regulation under FIFRA and FFDCA for being overly cautious and methodical. EPA was criticized for dragging its feet on both EDB²⁸² and Alar,²⁸³ as well as for its more general failure to consider a broader range of risks posed by pesticides such as risks to farmworkers,²⁸⁴ particular risks to children,²⁸⁵

276. See Hynes, *supra* note 121, at 18 (quoting Edwin Diamond, former editor of NEWSWEEK).

277. See R. Jeffrey Smith, *EPA Halts Most Uses of Herbicide 2,4,5-T*, 203 SCI. 1090 (1979) (“[A]n example of government at its worst—basing a hasty product suspension on data which have not been subjected to scientific review”) (quoting Etcyl Blair, spokesperson for 2,4,5-T’s producer, Dow Chemical Company); see also SHEILA JASANOFF, *THE FIFTH BRANCH: SCIENCE ADVISORS AS POLICYMAKERS* 24-26 (1990).

278. See William B. Havender, *EDB and the Marigold Option*, Jan.-Feb. 1984 REG. 13 (“Extremists controlled the momentum of these events . . .”); JASANOFF, *supra* note 277, at 130-33.

279. See Advertisement, N.Y. TIMES, Apr. 5, 1989, at A11 (full page advertisement signed by sixty-five scientists decrying EPA’s “unfounded attacks on the safety of our food supply”); JASANOFF, *supra* note 277, at 141-51.

280. 968 F.2d 985 (1992), *cert. denied*, 113 S. Ct. 1361 (1993).

281. *Id.*

282. See JASANOFF, *supra* note 277, at 135 (criticizing EPA for having authority to investigate substitutes to EDB for six years before acting).

283. See Linda M. Correia, “A” is for Alar: EPA’s Persistent Failure to Promptly Remove Hazardous Pesticides from the Food Supply, 16 Chem. Reg. Rep. (BNA) No. 20, 868, 878 (Aug. 14, 1992) (“The Alar case illustrates EPA’s timid approach to the enforcement of the pesticide laws”).

284. See, e.g., *Federal Protection of Farm Workers Cited as Inadequate in GAO Report*, 15 Chem. Reg. Rep. (BNA) No. 47, at 1689 (Feb. 28, 1992) (General Accounting Office critique of EPA’s “ cursory protection” of farmworkers from pesticide dangers); *Little Known About Potential Adverse Effects of Thousands of Chemicals, OTA Study Reports*, 14 Chem. Reg. Rep. (BNA) No. 7, at 251 (May 18, 1990) (critique by Office of Technology Assessment that EPA’s focus on carcinogenicity has downplayed neurotoxic effects that may pose an even greater threat to human health, especially among farmworkers); *Farm Workers Need Better Protection Against Toxic Chemical Exposures, Report Says*, 13 Chem. Reg. Rep. (BNA) No. 23, at 725 (Sept. 8, 1989) (no excuse for ignoring 313,000 cases of pesticide-related illness among farmworkers).

285. See, e.g., *Aldicarb Use on Citrus, Potatoes Poses Danger to Children, Leahy Charges*, 15 Chem. Reg. Rep. (BNA) No. 49, at 1784 (Mar. 13, 1992) (EPA failed to protect children from dangers associated with aldicarb application to citrus crops); *Regulatory Focus on 10 Foods Could Reduce Exposure Risk to Children, Senate Panel Told*, 15 Chem. Reg. Rep. (BNA) No. 15, at 461 (July 12, 1991) (residue limits do not always reflect safe levels for everyone, especially children, because of the composition of their diet and their low body weight relative to exposure).

the risks of inert ingredients,²⁸⁶ ecological risks,²⁸⁷ and the risks of ground-water contamination.²⁸⁸ In the most recent congressional hearings on FIFRA reform, the statute was characterized as having "simply . . . failed to assure that there will be timely and appropriate action taken to protect human health and the environment from pesticides."²⁸⁹

The major contention I make in this Section is that these twin criticisms, rather than reflecting only administrative missteps by EPA, reveal statutory tensions that were quite consciously designed by Congress into FIFRA itself. Although FIFRA in one sense freed pesticide regulation from the provincialism of agricultural interests in both Congress and USDA, in another sense FIFRA was set free only to wander in a procedurally complex labyrinth of risk-based decisionmaking. The quite predictable result is an analytical treadmill which makes—and is designed to make—forward progress strenuous if not impossible.

1. A "Republican Moment" Explanation of FIFRA

A conventional theme in the literature on pesticide regulation is that something like a prolonged "republican moment" began with the publication in 1962 of *Silent Spring* and ended in 1972 with significant, modernizing amendments to FIFRA. Such a conclusion is reflected in Philip Spector's observation that the 1972 amendments "made largely in response to the growing public concern about the environment in the 1960's and early 1970's, were designed to ensure more thorough consideration of the ecological and human health risks associated with the use of pesticides."²⁹⁰ Political

286. See, e.g., *EPA Plans to Disclose Entire Inert Ingredients List Under FOIA*, 14 Chem. Reg. Rep. (BNA) No. 20, at 789 (Aug. 17, 1990) (some inert ingredients are known to be more toxic than the active ingredients, and the public, because EPA has not required labeling of inerts, has no way of taking adequate precautions); *Food Safety Concerns Seen Prompting Major Changes in Federal, State Regulation*, 13 Chem. Reg. Rep. (BNA) No. 45, at 1436 (Feb. 16, 1990) (EPA faulted for not considering potential health effects of inert ingredients).

287. See, e.g., *New Tactics Needed to Address Ecology, Science Advisory Board Tells EPA Officials*, 21 Env't Rep. (BNA) No. 4, at 266 (May 25, 1990) (SAB Report criticized EPA for placing too much emphasis on human health issues and ignoring broader ecological issues); *Group Recommends Field Tests, Research, More Dialogue in Assessing Impacts on Birds*, 13 Chem. Reg. Rep. (BNA) No. 18, at 632 (Aug. 4, 1989) (bird mortality from pesticides indicates that there is broader ecological damage occurring).

288. See, e.g., *Thomas Says a Groundwater Protection Bill May Be Needed to Separate Federal, State Duties*, 18 Env't Rep. (BNA) No. 4, at 438 (May 22, 1987) (EPA's piecemeal approach to ground-water protection from various sources including pesticides needs to be integrated); *Conservation Group Assesses Contamination, Outlines Water Protection Program in Report*, 17 Env't Rep. (BNA) No. 40, at 1672 (Jan. 30, 1987) (calling for end of "regulatory patchwork" governing protection of ground water from pesticidal and other forms of contamination).

289. See *Hearings on Pesticide Safety Improvement Act of 1991 Before the Subcomm. on Dep't Operations, Research and Foreign Agriculture, House Comm. on Agriculture*, 102d Cong., 2d Sess. 176 (1992) (statement of Erik Olson, Senior Attorney, Natural Resources Defense Council).

290. Phillip L. Spector, *Regulation of Pesticides by the Environmental Protection Agency*, 5 ECOLOGY L.Q. 233, 233 (1976).

scientist Christopher Bosso, in one of the most comprehensive analyses of pesticide politics,²⁹¹ similarly refers to the political "sea changes" instigated by *Silent Spring* and says of the 1972 amendments, "if environmentalists did not get all they desired, they at least got a law that by many standards was better than before."²⁹² Judged by the closed politics of clientelism that characterized what had been termed a "pesticide subgovernment" prior to 1972,²⁹³ there is certainly an important element of truth in the conventional wisdom. To develop the point, as well as to develop the evidence which may undermine it, it is important to consider briefly the state of pesticide regulation prior to 1972.

In its earliest years, pesticide regulation was desultory at best under both the 1906 Pure Food and Drug Act,²⁹⁴ which delegated to USDA's Bureau of Chemistry the duty to protect consumers from impure food, and the 1910 Insecticide Act,²⁹⁵ which delegated to USDA the authority to protect farmers from false advertising and nonefficacious pesticides. Lax regulation by the Bureau of Chemistry caused USDA in 1925 to dissolve the Bureau and transfer its functions to USDA's newly created Food Drug and Insecticide Administration (later renamed the Food and Drug Administration)(FDA).²⁹⁶ In the 1930s FDA scientists began to use animal experiments and extrapolate from them the possible long-term effects of pesticides on humans.²⁹⁷ These incipient efforts were stymied in 1937, however, by Representative Clarence Cannon, chair of the powerful House Subcommittee on Agricultural Appropriations and a former apple grower who once proclaimed, "lead arsenate on apples never harmed a man, woman, or child".²⁹⁸ In a USDA appropriations bill, Congress prohibited the FDA from using funds "for laboratory investigations to determine the possibly harmful effects on human beings of spray residues on fruit and vegetables."²⁹⁹ In one of the first political efforts to shape science in support of pre-conceived social conclusions about pesticides, Cannon assigned research jurisdiction over the health effects of pesticides to the Public Health Service (PHS) a body which used the far less

291. CHRISTOPHER J. BOSSO, *PESTICIDES AND POLITICS* (1987).

292. *Id.* at 109-15, 177.

293. See Anthony J. Nownes, *Interest Groups and the Regulation of Pesticides: Congress, Coalitions, and Closure*, 24 POL'Y SCI. 1 (1991). See also BOSSO, *supra* note 291, at 59 ("The politics of FIFRA commenced under conditions particularly conducive to small-group, or subgovernment, dynamics [T]he primary relationships under such conditions are those among congressional leaders, the president, and the centralized bureaucracy, and the regulated interests").

294. Federal Food and Drugs Act of 1906, Pub. L. No. 59-384, 34 Stat. 768 (codified at 21 U.S.C. §§ 1-15 (1906)) (repealed 1938).

295. Insecticide Act of 1910, Pub. L. No. 61-152, 36 Stat. 331 (codified at 7 U.S.C. §§ 121-134 (1910)) (repealed 1947).

296. See BOSSO, *supra* note 291, at 49.

297. *Id.* at 50.

298. See THOMAS R. DUNLOP, *DDT: SCIENTISTS, CITIZENS AND PUBLIC POLICY* 50 (1981).

299. See BOSSO, *supra* note 291, at 50 quoting JAMES WHORTON, *BEFORE SILENT SPRING: PESTICIDES AND PUBLIC HEALTH IN PRE-DDT AMERICA* 230 (1974).

discriminating analytical approach of merely questioning farmers and field hands about their health.³⁰⁰ Although, in 1938, the Food Drug and Cosmetic Act³⁰¹ gave FDA the authority to set legal "tolerances" for pesticide residues, the tolerances still had to be based on PHS methodology. Furthermore, the new statute gave judicial appeal rights to any parties who might be "grievously affected" by even the inadequate tolerances that FDA could establish.³⁰² An executive reorganization in 1940 moved the FDA from USDA into the new Federal Security Agency, but its pesticide-related work remained firmly within the jurisdiction and watchfulness of congressional appropriations committees that were dominated by senior farm bloc legislators.³⁰³

The development of inexpensive, synthetic chemical pesticides between 1940 and 1945 led to enactment in 1947 of the original Federal Insecticide, Fungicide, and Rodenticide Act³⁰⁴ as a mechanism for regularizing the market for these new chemicals.³⁰⁵ The original FIFRA required USDA to "register" pesticides whenever their "labels" contained sufficient "directions for use which . . . if complied with [were] adequate for the protection of the public."³⁰⁶ Pesticides without such labels were considered "misbranded"³⁰⁷ and, although producers could insist that USDA register a product "under protest" (even when USDA had rejected a registration application or had proposed to cancel an existing registration),³⁰⁸ an action could be brought by the appropriate United States Attorney alleging that these "under protest" pesticides inadequately protected the public.³⁰⁹ In such a case, the government shouldered the burden of proving its allegations.³¹⁰ None of this was controversial. FIFRA came into the world by voice vote without "significant comment or debate,"³¹¹ reflecting the widely shared political perception that pesticide policy was mostly a matter of accommodating the interests of growers and the emerging chemical industry.³¹²

300. *Id.* at 50.

301. Food, Drug & Cosmetic Act of 1938, Pub. L. No. 75-717, 52 Stat. 1046 (1938) (codified as amended at 21 U.S.C. §§ 301-392 (1970)).

302. *See* BOSSO, *supra* note 291, at 51-52.

303. *Id.*

304. Federal Insecticide, Fungicide, and Rodenticide Act, Pub. L. No. 80-104, 61 Stat. 163 (1947).

305. *See* BOSSO, *supra* note 291, at 55-56 (industry sought a labeling statute to prohibit fly-by-night producers of imitations of the new synthetic chemicals).

306. Pub. L. No. 80-104 § 2(u)(2)(c), 61 Stat. 163 (1947).

307. *Id.*

308. *Id.* § 4(c).

309. *Id.* § 6(c).

310. *See, e.g.,* *Environmental Defense Fund v. Ruckelshaus*, 439 F.2d 584, 593 & n. 34 (D.C. Cir. 1971) (the effect of the "under protest" provision in the original FIFRA made it incumbent upon the government to prove the pesticide unsafe before the product could be removed from the market).

311. *See* BOSSO, *supra* note 291, at 58 (noting that passage of the Act was mentioned only in passing in the NEW YORK TIMES Food Section).

312. *Id.* at 59.

During the 1950s, public attitudes toward pesticides took shape with most, but not all, policies decidedly supportive of pesticide use. The only skeptical policies stemmed from congressional investigations chaired by New York Representative James Delaney into the growing use of synthetic chemicals in agriculture and the pharmaceutical industry,³¹³ and resulted in the addition of Sections 408 and 409 to the FFDCA in 1954 and 1958, respectively.³¹⁴ Apparently mindful of the way scientific methodology might be manipulated to shade the effects of pesticides, Representative Delaney explained that Section 409's ban on pesticide residues found to induce cancer in humans or animals (the so-called "Delaney Clause") had "slammed shut and locked" the door against the entry of carcinogens into the food supply.³¹⁵ Yet, despite such bold rhetoric, the Delaney Clause in fact became one of the least-used provisions of the FFDCA,³¹⁶ and the enactment of Sections 408 and 409 attracted little popular attention from a public who viewed the congressional debate as "esoteric and technical."³¹⁷ In contrast, there were far more visible public policies that openly supported pesticide use with almost unrestrained enthusiasm. In addition to subsidizing pesticide development in the country's land-grant colleges,³¹⁸ USDA organized several highly publicized "eradication" campaigns against the gypsy moth in the Northeast and the fire ant in the South. So supportive of these efforts was Representative Jamie Whitten, then Chair of the House Subcommittee on Agricultural Appropriations (and known for two decades in Washington as the "permanent Secretary of Agriculture"),³¹⁹ that he insisted on providing USDA with more funds for the

313. See generally, *Chemicals in Foods and Cosmetics: Hearings Before the House Select Comm. to Investigate the Use of Chemicals in Foods and Cosmetics*, 81st Cong., 2d Sess. and 82d Cong., 1st & 2d Sess. (1950-1952).

314. See Richard A. Merrill, *Regulating Carcinogens in Food: A Legislator's Guide to the Food Safety Provisions of the Federal Food, Drug, and Cosmetic Act*, 77 MICH. L. REV. 171, 179-80 (1978).

315. *Food Additives: Hearings on Bills to Amend the Federal Food, Drug, and Cosmetic Act with Respect to Chemical Additives in Food Before a Subcomm. of the House Interstate and Foreign Commerce Comm.*, 85th Cong., 2d Sess. 498 (1958). Delaney was speaking specifically about a 1955 FDA decision that had approved a one part-per-million tolerance for residues of the pesticide Aramite after concluding that such a residue level "would offer no hazard to the public." Tolerances and Exemptions from Tolerances for Pesticide Chemicals in or on Raw Agricultural Commodities, 20 Fed. Reg. 7301 (1955) (codified at 21 C.F.R. pt. 120). As Professor Richard Merrill has further chronicled, Delaney later supplemented his view of Section 409 by mentioning the Aramite decision by name: "Mr. Speaker, the significance of FDA's former ruling on Aramite was that for the first time a precedent was set that might give legal sanction to the introduction of so-called 'safe' quantities of cancer-inciting additives into food . . . [It is the] firm purpose [of the Delaney Clause] to slam shut and lock [the door that the ruling had opened]." 104 CONG. REC. 7783 (1958), cited in Richard A. Merrill, *FDA's Implementation of the Delaney Clause: Repudiation of Congressional Choice or Reasoned Adaptation to Scientific Progress?*, 5 YALE J. ON REG. 1, 55 n.288 (1988) (noting, however, other evidence indicating the language may in fact be ambiguous).

316. See Merrill, *supra* note 314, at 178.

317. See BOSSO, *supra* note 291, at 80.

318. See *National Research Council*, *supra* note 122, at 77 (most federal research funds to land grant colleges for pest control supported work on chemical technologies aimed at boosting yields).

319. See BOSSO, *supra* note 291, at 67.

campaigns than it had requested.³²⁰ When mounting evidence of fish and wildlife losses from these campaigns began to dissuade state officials from further cooperating, USDA offered literally to give away the fire-ant insecticide heptachlor to any private property owner willing to use it.³²¹ Despite a growing scientific consensus that the dangers presented by fire ants had been overblown,³²² USDA redoubled a "barrage of government press releases, motion pictures, and government inspired stories portraying the insect as a despoiler of southern agriculture and a killer of birds, livestock, and man."³²³

Ironically, it was USDA's intransigent support for the increasingly unpopular eradication campaigns in the 1950s that created a receptive public for Rachel Carson in 1962, and that ultimately prompted amendments to FIFRA in 1964 and 1972. Before focusing on those amendments, however, it is important to highlight one last aspect of the building "republican moment." Among other things, Carson questioned the government's manipulation of science to support the toxicological safety of pesticides by attacking the government's reliance on a National Academy of Sciences-National Research Council (NAS-NRC) pesticide panel which, in Carson's view, was dominated by industry-sponsored experts.³²⁴ When *Silent Spring* itself ignited a public controversy, President Kennedy bypassed NAS-NRC and sought policy advice from the President's Science Advisory Committee (PSAC), which issued a report in 1963 that largely supported Carson.³²⁵ There followed counter-studies from NAS-NRC attacking the PSAC,³²⁶ counter-counter-attacks on the NAS-NRC for itself being "unscientific,"³²⁷ and a further "proliferation of 'expert' studies, each claiming to be the definitive analysis on pesticides and debunking claims propagated by rival studies."³²⁸ It was against the backdrop of this quite politicized scientific debate that over a dozen separate committees or subcommittees of the 88th Congress held pesticide-related hearings between 1963 and 1964.

320. *Id.* at 82.

321. *Id.* at 102.

322. *Id.* at 85-86.

323. *Id.* at 88.

324. *Id.* at 116-17 (describing Carson's original writings in the *New Yorker*, from which *SILENT SPRING* was drawn).

325. See PRESIDENT'S SCIENCE ADVISORY COUNCIL, *USE OF PESTICIDES* (1963); see BOSSO, *supra* note 291, at 121-22 ("The PSAC panel acknowledged the benefits to society from chemical use, but overall concluded that 'the decisions on safety [were] not as well-based as those on efficacy,' and that 'until publication of *Silent Spring* by Rachel Carson, people generally were unaware of the toxicity of pesticides'").

326. See NATIONAL RESEARCH COUNCIL, NATIONAL ACADEMY OF SCIENCES, REPORT 920A, B, & C: *PEST CONTROL AND WILDLIFE RELATIONSHIPS* (1962-1963).

327. See BOSSO, *supra* note 291, at 124 (citing Audubon Society policy analyst Frank Graham).

328. *Id.* at 121.

The 1964 FIFRA Amendments which followed this burst of legislative activity are most widely noted for eliminating the ability of producers to compel USDA “under protest” to register a pesticide or to continue a pesticide’s registration.³²⁹ Although it was generally acknowledged that few producers had used this provision,³³⁰ its elimination was interpreted as signaling an important shift in the burden of proof needed by the government to keep pesticides off the market.³³¹ Whereas the “under protest” provision of the original FIFRA effectively required the government to prove the dangerousness of a pesticide in a judicial “misbranding” action,³³² the 1964 Amendments gave USDA final authority to refuse registration or to cancel existing registrations without going to court.³³³ Judicial review of the agency’s factual determinations was limited to the familiar “substantial evidence” test.³³⁴

In addition, USDA was given the authority to “suspend” a pesticide’s registration immediately “to prevent an imminent hazard to the public.”³³⁵ The 1964 Amendments have been interpreted as sending something of a warning shot over the bow of the “pesticide subgovernment”; the entrenched pro-pesticide interests on the congressional agriculture committees and at USDA were put on notice that policymaking needed to become more responsive to the public concerns that had been articulated by Rachel Carson.³³⁶ This is the “republican moment” explanation for the 1964 FIFRA Amendments. But before evaluating this explanation, and applying it to the more fundamental 1972 amendments, it is important to sketch the theoretical underpinnings of a competing explanation.

329. See, e.g., JOHN D. CONNER, JR. ET AL., *PESTICIDE REGULATION HANDBOOK* 2-3 (3rd ed. 1991).

330. See *Hearings on Interagency Environmental Hazards Coordination Before the Subcomm. on Reorganization and International Organizations of the Senate Comm. on Government Operations*, 88th Cong., 1st Sess. 15 (1963) (Only 23 of some 50,000 products were registered “under protest” between 1947 and 1963); see also BOSSO, *supra* note 291, at 126.

331. 110 CONG. REC. 2948-2949 (1964) (remarks of Congresswoman Sullivan) (“I am strongly in favor of the legislation now before you to require industry, rather than the Federal Government, to shoulder the burden of proof in connection with the marketing of pesticides which may be unsafe for use as intended”); see also H.R. REP. NO. 1125, 88th Cong., 2d Sess. 2 (1964), *reprinted in* 1964 U.S.C.C.A.N. 2166, 2167 (“[A]t present, the Secretary can be required to register a product even though he is convinced that it is ineffective and dangerous to human health. He can proceed against it . . . only after it has moved in interstate commerce, and he then has the burden of proving that it violates the law”).

332. See *supra* notes 307-10.

333. Federal Insecticide, Fungicide and Rodenticide Act, Amendment Pub. L. No. 88-305, 78 Stat. 190(3) (1964).

334. *Id.* § 190(4)(d).

335. *Id.* § 3.

336. BOSSO, *supra* note 291, at 125 (“The transformation in the pesticides debate was so swift that those promoting the use of pesticides were unprepared to deal with new sets of policy claimants. The twin blows delivered by *Silent Spring* and the PSAC report made it obvious to all save the most recalcitrant defenders of the status quo that some change would emerge as the debate moved from the front pages to the committee rooms and the federal office buildings”).

2. A "Game Theoretic" Explanation of FIFRA

In 1989, political economists Matthew McCubbins, Roger Noll, and Barry Weingast (known collectively as "McNollGast") argued that Congress, when it enacts statutes delegating policymaking tasks to agencies, will rationally design administrative structures and processes which lead to the types of substantive policy outcomes that are desired.³³⁷ The underlying dynamic which forces Congress to think so strategically about administrative form, McNollGast argue, is that agencies can to some extent ignore with impunity the substantive policy preferences implied in legislation. Agencies can play a "game" within a reasonably broad "policy space" in which policy moves a considerable distance from that envisioned in the enabling legislation, and towards a new point which so benefits either the House, Senate or President, that one or more of these players will rationally choose not to support (or will choose to veto) any *corrective legislation*.³³⁸ From the point of view of the enabling legislative coalition—the President (assuming he supports the bill) and the winning majorities in the House and Senate—the prospect of such "policy drift" is especially unnerving. Because neither the President nor the winning coalition in the House or Senate knows *ex ante* at whose expense (policy-wise) the agency's game will be played, each of them faces the dreary post-enactment prospect of "getting" to the agency before the others do.³³⁹ Yet this defeats the purpose of banding together into a legislative coalition in the first place. So, McNollGast predict, rational players will find it in their best interest to design into the enabling legislation *ex ante* administrative structures that protect against agency noncompliance.³⁴⁰

For the purposes of analyzing FIFRA, the significant aspect of the "McNollGast Hypothesis" is its tenet that administrative structures and processes can play distinctly political roles. First, Congress can design

337. Matthew D. McCubbins et al., *Structure and Process, Politics and Policy: Administrative Arrangements and the Political Control of Agencies*, 75 VA. L. REV. 431 (1989).

338. *Id.* at 435-39.

339. *Id.* at 439 (although "each of the three wants to minimize the chance that one of the other two will influence the agency against its interests . . . all have an *ex post* incentive to spend resources persuading the agency to sway policy their way. This is a negative sum game.")

340. McNollGast explain:

First, if political actors are risk averse, all three will prefer greater certainty in policy implementation as compared to random noncompliance (that is, noncompliance that may drift away from the preferred outcome of each of the three). Second, each of the three wants to minimize the chance that one of the other two will influence the agency against its interests. . . . Third, none of the parties wants to let the agency choose which political actor to favor.

Id. at 439.

administrative structures and processes so as to create informational requirements which affect the difficulty (or ease) of agency policymaking. These requirements can also give significant advantages to a favored constituency by increasing "the dependence of the agency on information the constituency supplies."³⁴¹ Second, Congress can require agencies to act only after observing certain procedural complexities, in part to create "fire alarms" on Capitol Hill, allowing alerted legislators to intercede before the agency can put together an uncorrectable "fait accompli."³⁴² The McNollGast Hypothesis has sparked a debate both about its theoretical premise³⁴³ and its empirical value as a "positive" model of political behavior.³⁴⁴ The sole statutory illustration offered by McNollGast themselves, the Clean Air Act, has drawn a particularly exhaustive critique.³⁴⁵ FIFRA, however, may provide fertile ground on which to test the model's robustness.

The 1964 FIFRA Amendments offer both some support and some difficulties for the McNollGast model. On the one hand, it is plain that Congress gave careful attention to the administrative structure and processes that USDA was to follow; indeed, these processes seemed to have been crafted by Congress to *undermine* the amendments' hallmark relaxation in the burden of proof. This was accomplished in two ways. First, although USDA could now refuse to register or cancel a registration without worrying about protest registrations, it could do so only after a formal "public hearing" if requested by the disappointed party.³⁴⁶ These formal cancellation proceedings soon became the most time-consuming adjudicatory proceedings in the federal government.³⁴⁷ Second, even before demanding a public hearing, disappointed parties were given the right to have USDA's proposed decision "referred to an advisory committee" composed of experts "*selected by the National Academy of Sciences*"—which at the time was the most visible scientific body known to be critical of Rachel Carson and generally convinced of the safety of pesticides.³⁴⁸ Although the advisory committee's reports were not binding on

341. *Id.* at 440.

342. *Id.* at 441.

343. See, e.g., Glen O. Robinson, *Commentary on "Administrative Arrangements and the Political Control of Agencies": Political Uses of Structure and Process*, 75 VA. L. REV. 483, 484 (1989) (McNoll-Gast's model ignores the difficulty "of successful political manipulation of process or structure without agreement on substantive policy choices").

344. *Id.* (The model's difficulties "are borne out by the most casual observations of administrative programs, few of which show evidence of the kind of political manipulation their model predicts").

345. Craig N. Oren, *Clearing the Air: The McCubbins-Noll-Weingast Hypothesis and the Clean Air Act*, 9 VA. J. ENVTL. L. 45, 46 (1989) ("their paper is marred by errors of interpretation and fact that give an incorrect picture of the politics and provisions of the Clean Air Act Amendments and of the linkage between substance and agency structure").

346. Pub. L. No. 88-305, 78 Stat. 190(3) (1964).

347. See, e.g. Thomas O McGarity, *Substantive and Procedural Discretion in Administrative Resolution of Science Policy Questions: Regulating Carcinogens in EPA and OSHA*, 67 GEO. L.J. 729 (1979).

348. See *supra* notes 324-27.

USDA, the 1964 Amendments seemed to specify with unusual clarity that courts were to affirm USDA's decisions "if supported by substantial evidence when considered on the record as a whole, including any report or recommendation of an advisory committee."³⁴⁹

On the other hand, for all the evidence of Congress's understanding that process can affect substance (one of McNollGast's central premises), McNoll-Gast predicted that the winning coalition would use process to safeguard—not undermine—the substantive gains made in the statute. This suggests either that process "losses" were traded off against substance "gains," (a bargaining strategy that has been suggested by others³⁵⁰ but is not consistent with the McNollGast model) or that, contrary to the "republican moments" explanation for the 1964 Amendments, it actually is not particularly clear whether the pro-pesticide or anti-pesticide side really won in 1964.³⁵¹

Events between 1964 and 1972, surprisingly, provide support for both the McNollGast Hypothesis and a republican moments theory of legislation. The defining event during this period was a "jolt" to business-as-usual politics caused by rising public concern about the pesticide DDT and by the emergence of environmentalism as a national political force. In a series of lawsuits in state courts between 1966 and 1969, the newly formed Environmental Defense Fund effectively put DDT "on trial" before a national audience.³⁵² Evidence of DDT's risks mounted, followed by numerous state and local prohibitions on DDT use³⁵³ and, in 1969, a federal task force's recommendation for a phased elimination of all but essential uses of DDT over two years.³⁵⁴ Given the predictable ineffectiveness of FIFRA, and the USDA's pro-pesticide mindset, it is not surprising that FIFRA played almost no role in these events; indeed, in early 1969 the General Accounting Office issued a report severely criticizing the lethargic track record USDA had developed under FIFRA.³⁵⁵ Following that most quintessential of republican moments, Earth Day 1970, President Nixon sought to capitalize on rising voter support for environmental issues by creating EPA, and transferring to it all responsibility for administering FIFRA, for pesticide tolerance-setting under FFDCA, and for several other pesticide-related research functions that had been scattered across the federal govern-

349. Pub. L. No. 88-305, 78 Stat. 190(3) (1964).

350. See Terry M. Moe, *Political Institutions: The Neglected Side of the Story*, 6 J.L. ECON. & ORG. 213, 220 (1990) ("public agencies will tend to be structured in part by their enemies—who want them to fail").

351. See BOSSO, *supra* note 291, at 125-32 (noting the competing "successes" of pro-pesticide and anti-pesticide forces in the 1964 Amendments).

352. *Id.* at 135-37 (describing litigation and the role it played in forming the Environmental Defense Fund as well as environmentalism generally).

353. *Id.* at 138 (collecting state and local statutes).

354. U.S. DEP'T OF HEALTH, EDUCATION & WELFARE, REPORT OF THE SECRETARY'S COMMISSION ON PESTICIDES AND THEIR RELATIONSHIPS TO ENVIRONMENTAL HEALTH 8 (1969) (the Mark Commission).

355. See U.S. GENERAL ACCOUNTING OFFICE, NEED TO IMPROVE REGULATORY ENFORCEMENT PROCEDURES INVOLVING PESTICIDES (Sept. 10, 1968).

ment.³⁵⁶ In 1971, the D.C. Circuit interpreted FIFRA's cancellation provision to require the initiation of cancellation proceedings against a pesticide when the Agency had expressed "substantial questions concerning [its] safety."³⁵⁷ The combined effect of all this activity was plainly a shift in pesticide policy-making toward more regulation. And, as the McNollGast model predicts, because the shift worked to the advantage of some of the political principals (for example, President Nixon), it was impossible for others to budge the new equilibrium point through corrective legislation.

But, although the status quo ante could not be completely regained (that is, FIFRA could not be immediately returned to USDA), the 1972 FIFRA Amendments demonstrate a major conceptual limitation of the McNollGast Hypothesis. The limitation stems from the fact that legislators and agencies rarely view statutes as *all* good or *all* bad; some provisions are preferred over others. When policy "drifts" during implementation, it usually occurs one provision at a time (typically through a rulemaking). Accordingly, if the agency plays McNollGast's implementation game, it has no guarantees that the disaffected principals will not be able to form retaliatory coalitions to change other provisions which the agency would prefer to leave alone or to withhold from the agency something that it doesn't have but wants. Knowing this, one wonders why the agency will attempt to get away with what it can on any one policy; to paraphrase McNollGast, if an agency is risk averse it will prefer certainty in its delegated authority to random retaliation by its principals.³⁵⁸ But if the agency does insist on gaming the system as to a single policy, it may be possible for disaffected principals to get back some of the ground they lost.

Just such retaliation happened in the politics of FIFRA in the 1972 and 1975 Amendments. In 1972, environmentalists pressed the political advantages given them by the public's heightened anti-pesticide sentiment by insisting on rescission of the registrant's "right" to refer agency decisions to the NAS advisory committee; after 1972, such referrals became discretionary with the EPA trial examiner.³⁵⁹ Next, environmentalists also gained a much-desired "classification" system for registering pesticides either as "general use" or "restricted" pesticides, with restricted-use chemicals allowed to be used only under the supervision of "certified applicators."³⁶⁰ Finally, the standard for

356. EPA was created by Executive Order in 1970. See Alfred A. Marcus, *EPA's Organizational Structure*, 54 LAW & CONTEMP. PROBS. 5, 9-10 & n.25 (1991).

357. See *Environmental Defense Fund v. Ruckelshaus*, 439 F.2d 584, 595 (D.C. Cir. 1971); see also Angus MacIntyre, *A Court Quietly Rewrote the Federal Pesticide Statute: How Prevalent is Judicial Statutory Revision?*, 7 L. & POL'Y 249 (1985).

358. See McNollGast, *supra* note 337, at 439.

359. See Pub. L. No. 92-516, sec. 2, § 6(d), 86 Stat. 973, 986-87 (codified at 7 U.S.C. § 136d(d) (1972)).

360. *Id.* § 3(d).

registration became no "unreasonable adverse effects on the environment" rather than a stricter "substantial environmental effects" test that had been proposed in a competing bill.³⁶¹ Moreover, EPA could now require registrants to support their registrations with specified types of data.³⁶² All of these provisions can be viewed as collectively relaxing EPA's burden of proof for regulating pesticides; to give McNollGast credit, they can also be viewed as examples of legislative victors "hardwiring" administrative structures and processes into legislation to ensure that the "right" substantive policy choices would subsequently be made.

The problem, however, is that other provisions in the 1972 Amendments plainly made it more difficult for EPA to regulate pesticides. Most significantly, an indemnification provision was added which required EPA to indemnify "any person" who suffers financial losses "by reason of a pesticide's suspension or cancellation"³⁶³—a provision which hung around the Agency's neck until 1988, forcing it to contemplate depletion of its operating budget any time it began efforts to protect public health. In addition, a new section 3(c) provided that a pesticide's "lack of essentiality" could not be used as a criterion for denying registration³⁶⁴—despite strenuous arguments from EPA that essentiality should be a primary criterion to reduce what was then viewed as a "glut of available products."³⁶⁵

In short, the development of FIFRA through 1972 presents evidence for and against the McNollGast Hypothesis as well as evidence for and against a republican moment explanation of environmental legislation. Developments after 1972 continue to suggest that the politics of pesticides are more dynamic and complex than can be captured by either of these theories alone.

Almost immediately after the 1972 Amendments were in place, EPA's Office of General Counsel (OGC) intensified its efforts to cancel the registrations of several organochlorines including DDT, Aldrin/Dieldrin, Heptachlor/Chlordane, and Mirex.³⁶⁶ OGC attorneys, however, soon learned how demanding the "unreasonable risk" standard could be; the bellweather proceeding against DDT became mired in the endless evidentiary possibilities for asserting, and challenging, the extent of all the various risks (to wildlife, to

361. See BOSSO, *supra* note 291, at 160 (table 7) (describing competing legislative proposals).

362. See Pub. L. No. 92-516, sec. 2, § 3(c)(1), 86 Stat. 973, 979-81 (codified at 7 U.S.C. 136a(c)(1) (1972)).

363. Pub. L. No. 92-516, sec. 2, § 15(a), 86 Stat. 973, 993-94 (codified at 7 U.S.C. 136m(a) (1)-(2) (1972)).

364. See Pub. L. No. 92-516, sec. 2, § 3(c)(5), 86 Stat. 973, 981 (codified at 7 U.S.C. 136a(c)(5) (1972)).

365. See BOSSO, *supra* note 291, at 163.

366. See Angus MacIntyre, *Administrative Initiative and Theories of Implementation: Federal Pesticide Policy, 1970-1976*, in PUBLIC POLICY AND THE NATURAL ENVIRONMENT 205, 215 (H. Ingram & R. Godwin eds., 1985).

farmworkers, to consumers) posed by DDT.³⁶⁷ To streamline the cancellation proceedings, OGC attorneys streamlined the analysis. Rather than an open-ended inquiry into the universe of risks and benefits, the Agency began to focus its case on animal data showing a pesticide's carcinogenicity, on evidence of widespread human exposure to the pesticide, and on evidence of increasing pest resistance from which the Agency could downplay the pesticide's benefits.³⁶⁸ Using this formula, EPA prevailed in each of its cancellation proceedings, although even under the streamlined inquiry the adjudicatory proceedings each took over two years to complete.³⁶⁹

As EPA successfully began to ban pesticides, however, it only highlighted the immensity of the Agency's regulatory task: the enormous effort required by the handful of cancellation proceedings hardly made a dent in the Agency's statutory duty to reregister the entire inventory of 50,000 existing products, containing hundreds of active ingredients.³⁷⁰ The 1972 Amendments had required EPA to promulgate implementing regulations within two years and to complete reregistration of all existing pesticides within four years.³⁷¹ Although this task belonged to the Agency's scientists in the Office of Pesticide Programs (OPP) rather than to the OGC attorneys, OPP staff borrowed the streamlined analytical approach pioneered by OGC in the cancellation proceedings and crafted an innovative regulatory device, the "rebuttable presumption against registration" (RPAR) for use in the Agency's registration and reregistration programs.³⁷² If a pesticide ingredient was found to be oncogenic in test animals, it automatically triggered a RPAR process under which the burden of proof formally shifted to manufacturers to submit data rebutting the presumption to avoid Agency issuance of notices of intent to cancel.³⁷³ If further data were not required, products were eligible for full reregistration.³⁷⁴ The RPAR was viewed as a promising regulatory initiative that "preferred a substantial reduction of [the reregistration] caseload by providing a screening device which would rapidly isolate, and focus available evaluation capacity on, the worst chemicals while the safer ones underwent pro forma reregistration."³⁷⁵

367. See *id.* at 215 ("In many respects the first hearing, against DDT, was a disaster for EPA [T]he proceeding was unfocused and the adversaries could adopt a strategy of evidentiary all-inclusiveness which obscured the central questions").

368. See *id.* at 216.

369. *Id.*

370. See STAFF OF THE SUBCOMM. ON ADMIN. PRACTICE AND PROCEDURE OF THE SENATE JUDICIARY COMM., 94TH CONG., 2D SESS., *THE ENVIRONMENTAL PROTECTION AGENCY AND THE REGULATION OF PESTICIDES* 11 (Comm. Print 1976) [hereinafter the KENNEDY REPORT] (35,000 products had been registered under prior federal laws and 15,000 under various state laws).

371. Pub. L. No. 92-516, sec. 4, 86 Stat. 973, 998-99 (1972) (amended 1978).

372. See MacIntyre, *supra* note 366, at 217.

373. See 40 C.F.R. § 162.43(f)(1)(i)(A)(3) (1976).

374. *Id.* § 162.43(f)(1)(i)(A)(1).

375. See MacIntyre, *supra* note 366, at 215-16.

These EPA initiatives, however, provoked a political backlash that demonstrates both the strengths and fragility of the McNollGast Hypothesis in constructing a positive political theory of environmental legislation. The 1972 Amendments contained a sunset clause which required reauthorization of FIFRA before October 1975.³⁷⁶ Concerned that EPA's initiatives reflected too risk averse an attitude toward pesticides, the agrichemical industry complained to Congress that EPA's pesticide programs had been wrenched away from scientists by agency lawyers.³⁷⁷ FIFRA approached expiration several times, to be extended only for pointedly short periods of time while the House Agriculture Committee held hearings excoriating EPA Administrator Russell Train for acting "unscientifically" and extracting a pledge from Train to "demote" OGC attorneys and elevate OPP scientists as the "primary" office at EPA in charge of pesticide policy.³⁷⁸ Not content with this concession, Congress amended FIFRA in 1975 to establish a Scientific Advisory Panel (SAP) which EPA was required to "consult" prior to making cancellation decisions or promulgating regulations affecting registration.³⁷⁹ In addition, the 1975 Amendments required EPA to notify USDA of proposed cancellations, changes in classification, or proposed regulations (an amendment that would have granted USDA "veto" power over all EPA pesticide decisions came within eight votes of passing the House),³⁸⁰ and required EPA to "take into account the impact of major regulatory action on production and prices of agricultural commodities, retail food prices, and otherwise on the agricultural economy."³⁸¹

Although these changes are repeatedly described in the legislative history merely as securing good science³⁸² and balanced consideration of risks and benefits,³⁸³ one observer of FIFRA has concluded that the 1975 Amendments "gave back to the agriculture lobby a little of the ground it lost when pesticide regulation was removed from the U.S. Department of Agriculture and placed within the newly established EPA."³⁸⁴ Another commenter has stated more

376. See Pub. L. No. 92-516, sec. 2, § 27, 86 Stat. 973, 998 (1972) (codified as amended at 7 U.S.C. § 136y (1988)). Although a sunset clause might be rationalized by McNollGast as a warning device designed to prevent policy drift at EPA, its existence is otherwise difficult to square with McNollGast's prediction that legislators try to "hardwire" administrative procedures into statutes so as to make it unnecessary for Congress to rely on its oversight capabilities.

377. See MacIntyre, *supra* note 366, at 219-20.

378. *Id.* See also House Comm. on Agriculture, *Business Meetings on FIFRA Extension, June-November 1975*, 94th Cong., 1st Sess. 73 (1975) [hereinafter *FIFRA Extension Meetings*].

379. See Act of November 28, 1975, Pub. L. No. 94-140, sec. 1, § 6(b), 89 Stat. 751, 751-53 (codified at 7 U.S.C. § 136d(b), (d) (1975)).

380. See *id.*; 121 CONG. REC. 9190-91 (daily ed. Sept. 16, 1975) (remarks of Representatives Young and Latta) (USDA "veto power" amendment).

381. See Act of November 28, 1975, Pub. L. No. 94-140, sec. 1, § 6(b), 89 Stat. 751, 751-53 (codified at 7 U.S.C. § 136d(b), (d) (1975)).

382. See *FIFRA Extension Hearings*, *supra* note 378, at 125, 138, 146.

383. *Id.* at 125

384. See JASANOFF, *supra* note 277, at 124.

bluntly, “[t]he 1975 amendments . . . were the result of agribusiness dissatisfaction with EPA’s attempts to take effective, forceful action to protect public health and the environment.”³⁸⁵

The 1975 Amendments demonstrate both the limits and usefulness of the McNollGast Hypothesis. Although, as McNollGast predict, the new legislative coalition tried to “hardwire” administrative structures and processes (SAP and USDA consultation) which reflected the coalition’s substantive preferences (which had now plainly shifted to the agriculture side of pesticide policy), Congress in 1975 retaliated against EPA by “unwiring” the administrative features of the 1972 Amendments that had made aggressive regulation of pesticides possible in the first place. At least as to pesticide regulation, McNollGast overemphasize the singular importance of administrative structure as a political device and underestimate the more traditional policing function of legislative oversight and correction. On the other hand, consistent with the McNollGast Hypothesis, the 1972 and 1975 amendments together indicate the usefulness of administrative procedures in telegraphing to Congress significant agency action that Congress might choose to police. What seems clear in any case is that, by 1975, the republican-moment aspect of pesticide regulation could not alone provide a political theory of FIFRA. As political scientist Angus MacIntyre concludes, “[a]t the very least, ‘the environment’ lost its aura of sacrosanct national priority . . . [as] industries [began] challenging the environmental *carte blanche* in a manner that was infeasible before the 1972 presidential elections.”³⁸⁶

3. FIFRA and the Politics of Risk Analysis

By 1975, the core elements of contemporary pesticide regulation were in place. The ease with which EPA could cancel a registration had been tempered by the new procedural requirements of consultation with SAP and USDA and by the substantive requirement of weighting more heavily the agricultural benefits of pesticides. At the same time, EPA’s primary regulatory program had shifted from cancellation to reregistration, and from the lawyers at OGC to the scientists at OPP.

This basic structure, of pesticide regulation as a regularized, scientific endeavor, has been reinforced in all subsequent FIFRA amendments. In 1978, FIFRA was amended to expand the role of the SAP³⁸⁷ and to allow for “Special Reviews” (a new term given to RPARs) only on the basis of a “validated

385. William E. Reukauf, *Regulation of Agricultural Pesticides*, 62 IOWA L. REV. 909, 918 (1977).

386. MacIntyre, *supra* note 366, at 218.

387. See Federal Pesticide Act of 1978, Pub. L. No. 95-396, sec. 11., § 6(b), 92 Stat. 819, 828 (codified at 7 U.S.C. § 136d (1978)) (requiring SAP review of proposed and final regulations).

test or other significant evidence of unreasonable adverse risk.”³⁸⁸ EPA shifted its reregistration focus from the 50,000 end products to the more manageable 600 active ingredients of these products,³⁸⁹ and was given “data call-in” authority in the 1978 Amendments by which the Agency could require registrants to provide data to support a pesticide’s continued registration.³⁹⁰ In 1980, FIFRA was again amended to increase the role of “science” and the SAP,³⁹¹ with EPA now required to obtain peer review of its scientific findings³⁹² and to consult with the SAP on suspension as well as cancellation decisions.³⁹³ In 1988, FIFRA was amended yet again, to accelerate reregistration through a newly created five-step process designed to complete, by 1997, the development of “registration standards” for all active ingredients and the reregistration under those standards of all active ingredients.³⁹⁴

Although the growing centrality of risk assessments under FIFRA is often taken to underscore the “scientific” nature of EPA’s regulation of pesticides, risk analysis also serves as a procedural device that favors pesticide-using political constituencies in three ways. First, because EPA has no independent method of developing data, risk analysis makes EPA dependent on the data generated by pesticide manufacturers—raising opportunities for various types of bias. Informational bias is not limited to cases of outright data falsification, although certainly it is important to note that falsification scandals have more than once rocked OPP’s registration programs.³⁹⁵ The more intractable prob-

388. See Federal Pesticide Act of 1978, Pub. L. No. 95-396, sec. 6, § 3(c), 92 Stat. 819, 826 (codified at 7 U.S.C. § 136a(c)(8) (1978)).

389. See Federal Pesticide Act of 1978, Pub. L. No. 95-396, sec. 1, § 2, 92 Stat. 819, 819 (codified at 7 U.S.C. § 136(w) (1978)).

390. Section 3(c)(2)(B); see Robert Perlis, *The Push for Data on Existing Pesticides*, 4 NAT. RES. & ENVT. 6, 7 (1990).

391. See Act of December 17, 1980, Pub. L. No. 96-539, sec. 1, § 25(d), 94 Stat. 3194, 3194 (codified at 7 U.S.C. § 136w(d) (1980)) (SAP authorized to create its own subpanels and requiring Administrator to solicit comments from SAP on suspension as well as cancellation decisions); Act of December 17, 1980, Pub. L. No. 96-539, sec. 2(a), § 25(e), 94 Stat. 3194, 3194 (codified at 7 U.S.C. § 136w(e) (1980)) (EPA required to specify procedures for peer review of the design, protocols, and conduct of major scientific studies performed by or relied upon by EPA in initiating changes in classification, suspension or cancellation).

392. *Id.*

393. *Id.*

394. See Federal Insecticide, Fungicide, and Rodenticide Act Amendments of 1988, Pub. L. No. 100-532, sec. 102(a), § 3(a), 102 Stat. 2654, 2655-63 (1988) (codified as amended in 7 U.S.C. § 136a-1(b)-(g) 1988)).

395. The major scandal involved Industrial Biotech (IBT), the nation’s largest chemical testing firm, which in 1976 caused OPP to halt all registration action after IBT was found to have falsified outright registration data for over 200 pesticides. See BOSSO, *supra* note 291, at 199; STAFF OF SENATE COMM. ON THE JUDICIARY, 94TH CONG., 2D SESS., REPORT ON THE ENVIRONMENTAL PROTECTION AGENCY AND THE REGULATION OF PESTICIDES 4 (Comm. Print 1976) (“[S]everal years of regulatory effort will have to be completely reexamined, substantially redone, and fundamentally redirected if the Congress and the public are to have a reasonable basis to conclude that today’s pesticides do not pose a significant risk to human health and the environment”).

lems are foot-dragging in submitting data to OPP³⁹⁶ and the ability of industry to shade the way data is presented (without falsification) simply by emphasizing the subtle but genuinely contestable “inference options” on which risk assessments depend.³⁹⁷ In the mid-70s, an internal EPA audit on the data underlying twenty-three randomly selected pesticides found that “all but one of the tests reviewed were unreliable and inadequate to demonstrate safety”³⁹⁸—a level of unreliability that, by 1992, continued for at least some pesticides.³⁹⁹ Not only has OPP proven incapable of policing for such subtle manipulations of data,⁴⁰⁰ but the quantity of data is so voluminous that EPA has repeatedly acceded to pressures merely to “satisfice” in its data management: in the mid-1970s EPA sought to create the illusion of regulatory progress by reregistering pesticides simply by determining whether safety data was “on file” rather than accurate;⁴⁰¹ in the late 1980s EPA was crediting itself for the “completion” of interim pesticide registration standards when in fact the standards had only identified missing data.⁴⁰² By mid-1992, the Agency openly worried that the rate at which it rejected industry studies was “too high” because it would prevent reregistration by the new target date of 1997, or even beyond an extended target of 2002.⁴⁰³ In short, the risk assessment enterprise is so information intensive that it creates strategic incentives to avoid a serious scientific examination of “true” levels of public health and environmental risk.

Second, despite the burden of proof ostensibly shouldered by pesticide manufacturers under FIFRA, the informational demands of risk analysis doom the regulatory process to a perpetual state of slow motion. The General Accounting Office (GAO) reported in March 1992 that, “[a]fter some 20 years

396. See U.S. GENERAL ACCOUNTING OFFICE, PESTICIDES: 30 YEARS SINCE SILENT SPRING—MANY LONG-STANDING CONCERNS REMAIN 3-5 (July 23, 1992).

397. On the theoretical literature on industry incentives to bias data in this way, see *supra* notes 248-49. On the importance of inference options to risk assessments, see *supra* 250-52.

398. Reukauf, *supra* note 387, at 917, citing *Joint Hearings on Safety Testing of Pesticides in Nongovernment Labs Before the Subcomm. on Health of the Senate Labor and Public Welfare Comm. and the Senate Judiciary Comm.*, 94th Cong., 2d Sess. 619-20, 646, 649 (1976) (testimony of Melvin D. Reuber, M.D.). In the EPA hearings on the suspension of heptachlor/chlordane, there were uncovered “innumerable examples or sloppy and inaccurate data, in addition to abundant evidence that much of the pathology data as submitted by industry was based upon the diagnostic opinion of pathologists . . . whose views were at best extremely conservative.” *EPA’s Implementation of the Pesticides Control Act: Hearings Before a Subcomm. of the House Comm. on Government Operations*, 94th Cong., 2d Sess. 34-35 (1976) (letter from Jeffrey H. Howard et al. to Hon. William S. Moorhead).

399. U.S. General Accounting Office, *supra* note 396, at 8 (“EPA officials reported that as much as 60 percent of the disinfectants data in one system may be inaccurate or incomplete”).

400. *Id.*

401. See Comment, *Pesticide Regulation: Risk Assessment and Burden of Proof*, 45 GEO. WASH. L. REV. 1066, 1090 (1977) (citing KENNEDY REPORT, *supra* note 370, at 15). As of March 1975, EPA’s reregistration “task force” had only two scientists; OMB had turned down EPA’s request for 100 additional positions to staff the reregistration project. *Id.*

402. *Id.*

403. See *Lowered Data Rejected Rate Needed to Meet 2002 Reregistration Target*, Chem. Reg. Daily (BNA) (Aug. 4, 1992) available in LEXIS, BNA Library, BNACRD File.

collecting data to reevaluate the health and environmental effects of 19,000 older pesticides, EPA . . . had reregistered only 2 products."⁴⁰⁴ Despite a congressional deadline of 1997 recently set for reregistration, GAO confirms EPA's own projections that the reregistration effort will extend "until early in the next century."⁴⁰⁵ Even when EPA chooses to act, the risk analyses required for Special Reviews or cancellation proceedings effectively inoculate pesticide manufacturers against timely action. Special Reviews, which were introduced in the mid-1970s to accelerate the cancellation process which then took an average of two years, now themselves average over seven years.⁴⁰⁶ To take action against the fungicide Captan, EPA's Special Review required nine years;⁴⁰⁷ action against the ethylene bisdithiocarbamates (EBDCs), another fungicide, took twelve years;⁴⁰⁸ action against Alar took seventeen years from the date EPA first learned of data suggesting carcinogenicity.⁴⁰⁹ As a practical matter, the burdensomeness of risk analysis has tempered FIFRA's success in shifting the burden of proof to manufacturers.

Third, risk analysis offers the conceptual umbrella of "science" under which numerous non-scientific values can take shelter from public scrutiny and yet prolong the longevity of pesticides that may be neither desirable nor needed. Consider, for example, the decidedly nonscientific question of deciding how risk averse to be when evaluating uncertain data. Pursuant to its understanding of congressional intent, EPA adopted in a rulemaking the fairly risk averse posture of both depending on animal data to estimate a pesticide's human carcinogenicity and on using a "dose-response" relationship that "credited" animal cancers which arose at anatomical sites for which humans did not have exact analogues (such as tumors that arose in the forestomachs of mice).⁴¹⁰ Yet during the SAP's review of the nematocide EDB, members of the SAP questioned in the name of science the wisdom of both of these judgments, suggested that attempts at quantification would be unscientific and simply based on "gimcrack mathematics," and argued instead for "qualitative"

404. See U.S. GENERAL ACCOUNTING OFFICE, *supra* note 396, at 1.

405. *Id.* at 1.

406. See Marina M. Lolley, *Carcinogen Roulette: A Game Played Under FIFRA*, 49 MD. L. REV. 975, 991 & n.141 (1990) (citing EPA, Office of Pesticides: How Long and How Resolved (Oct. 1989)).

407. See Captan; Intent to Cancel Registrations; Conclusions of Special Review, 54 Fed. Reg. 8116 (1989) (concluding Special Review) (announced Feb. 24, 1989); Rebuttable Presumption Against Registration and Continued Registration of Pesticide Products Containing Captan, 45 Fed. Reg. 54,938 (1980) (initiating Special Review) (announced Aug. 18, 1980).

408. Linda M. Correia, "A" is for Alar: EPA's Persistent Failure to Promptly Remove Hazardous Pesticides From the Food Supply, 16 Chem. Reg. Rep. (BNA) No. 20, at 880 (Aug. 14, 1992) ("EPA spent 12 years evaluating EBDCs. One Special Review began in 1977, and another in 1987. Final cancellation is still pending").

409. See *id.*, at 868, 869.

410. See EPA, Guidelines for Carcinogen Risk Assessment, 51 Fed. Reg. 33,992, 33,997 (1986) (approving dose-response relationship based on different tumor types and sites observed in same study).

scientific judgments about carcinogenicity.⁴¹¹ This appropriation of “science” to cover nonscientific preferences was reflected again in the SAP’s review of the plant growth regulator Alar. Unlike the EDB episode, this time the SAP refused to answer the “qualitative” question that had been put—whether, on the basis of seven studies indicating carcinogenic effects, EPA could make a qualitative, “weight-of-the-evidence” judgment about Alar’s carcinogenicity. Instead the panel insisted that regulating Alar would be unscientific because some of the studies had followed inadequate protocols.⁴¹² This was, of course, another way of imposing in the name of “science” a scientist’s occupational preference for deliberate methodology onto an equally legitimate, but more risk averse, political preference for prophylactic action on the basis of “enough” information. In the case of Alar, the SAP’s nonscientific value judgments delayed regulation in the name of “science” for several years even though later studies have confirmed that Alar’s dangers were sufficiently great to have justified EPA’s initial regulatory judgment.⁴¹³

Given that risk analysis has political features and pro-pesticide consequences, it is not surprising to account for the politics of pesticides since the mid-1980s. Since FIFRA has settled into its risk analysis mode, pesticide opponents have rationally sought to move the debate “to the media and the corridors of politics, where it can be conducted under different and more flexible ground rules from those acceptable to science.”⁴¹⁴ This accounts for events such as the celebrated “60 Minutes” episode about Alar in which CBS reporter Ed Bradley described Alar as “the most potent cancer-causing agent in our food supply;”⁴¹⁵ increased state and local regulatory efforts;⁴¹⁶ increased congressional activity in such environmentally-oriented fora as the House Subcommittee on Department Operations, Research, and Foreign Agriculture⁴¹⁷ and the Senate Subcommittee on Administrative Practice and Procedure; and efforts to build incentives for “low-input” agriculture in the (non-risk-analysis-oriented) farm bills of 1985 and 1990.⁴¹⁸ In all of these instances, the political attention directed to pesticides has often been derided as nonscientific. Such events are better characterized, however, as parts of a political debate that seeks to move beyond the political bias of risk analysis.

411. See JASANOFF, *supra* note 277, at 136.

412. *Id.* at 144-49.

413. See *id.* at 146-49.

414. *Id.* at 151.

415. See James Warren, *How “Media Stampede” Spread Apple Panic*, CHI. TRIB., Mar. 26, 1989, at C1.

416. See JASANOFF, *supra* note 277, at 132 (state actions on EDB), 147 (state action on Alar); on the legality and prevalence of state actions on pesticides generally, see *supra* notes 117-18.

417. DORFA has been a prime congressional locus for efforts to reform FIFRA to reduce many of the biases that I have identified. See, e.g., *The Pesticide Safety Improvement Act of 1991: Hearings on H.R. 3742 Before the Subcomm. on Dep’t Operations, Research, and Foreign Agriculture of the House Comm. on Agriculture*, 102d Cong., 1st & 2d Sess. at 1-2 (Nov. 19, 1991 & Mar. 18-19, 1992).

418. See *supra* notes 193-94.

IV. Probing for Cause-Oriented Reform: Making the Most of Science and Politics

If there is a central lesson to be learned from pesticide regulation for environmental law reform in general, it is that strategies are needed which can both strike while the iron is hot and strike while the iron is cold. By "hot" I mean in the heat of widespread political interest—in what might be called republican moments. Prevailing sentiment formed during such times not only represents collective preferences which are democratically legitimate, but also collective preferences which tend to reflect the qualitative attributes of environmental risk that are poorly captured by scientific risk assessments. By "cold" I mean during ordinary periods of political activity (the "nonrepublican moments"). Structures which promote responsible environmental action during these periods can sustain environmental protection long after passions have subsided, and might also better apply undramatic but often valuable scientific analysis. In this Part of the Article, I shall expand on these distinctions and propose mechanisms for integrating the two approaches, using as illustrations both pesticide regulation and the frequently mentioned "alternative" project of encouraging low-input agriculture.

At the outset, it is important to recognize the misstep that may have been made in 1990 by EPA Administrator Reilly when, in the name of "science," he so strongly endorsed risk-oriented reforms;⁴¹⁹ by so strongly linking science and risk reduction, he threatened unnecessarily to undermine the credibility of each. As a theoretical matter, science alone does not (and cannot) reflect a society's collective preferences about environmental risk because it does not possess a mechanism to aggregate a citizenry's numerous, and subjectively held, individual risk preferences.⁴²⁰ The task of collective

419. See William K. Stevens, *What Really Threatens the Environment?*, N.Y. TIMES, Jan. 29, 1991, at C4. Stevens reports:

William K. Reilly . . . told a Senate committee in Washington on Friday that in many cases, the public and Congress are at odds with scientists over which environmental threats are the most serious. He has begun a campaign to reassess those priorities, and he leaves no doubt that his money is on the scientists.

See also *Reducing Risk, Setting Priorities and Strategies for Environmental Protection: Hearings on Recent Science Advisory Board Report Before the Senate Comm. on Env't and Pub. Works*, 102d Cong., 1st Sess. 48 (1991) (statement of William Reilly, Administrator, EPA) (Reilly argued that EPA "must ground itself on solid science" rather than being "transported by middle-class enthusiasms").

420. The most theoretically rigorous methodology for comparing risks is expected utility theory, developed in JOHN VON NEUMANN & OSKAR MORGENSTERN, *THEORY OF GAMES AND ECONOMIC BEHAVIOR* (1944). Yet von Neumann and Morgenstern couldn't have been more emphatic in defending expected utility theory as normative only for *individual* decisionmaking under risk and in cautioning against its use to justify *collective* decisions that govern individuals with different subjective attitudes toward risk. See *id.* at 19 n.3 ("We have not obtained any basis for a comparison, quantitatively or qualitatively, of the utilities of different individuals") (quoted and discussed in Hornstein, *supra* note 7,

decisionmaking, in a democracy, falls to politics and will involve any number of inescapably nonscientific judgments. By disparaging politics and overemphasizing science, Reilly not only distracts us from the need to study and improve the politics of risk, but he threatens to "set up" (and ultimately tarnish) the science of risk analysis by demanding it play a role for which it lacks theoretical capacity.

Although this point is often illustrated by the difficulties faced by science in comparing different kinds of risk,⁴²¹ it can be nicely illustrated even by the more limited scientific task of assessing the relative risks of pesticides. Traditionally, EPA has tended to use carcinogenicity as a common metric.⁴²² Yet even by this single measurement, how are we to decide "scientifically" on an acceptable level of cancer risks to sensitive consumer subpopulations such as children (just this question underlay much of the dispute over Alar⁴²³) or on the acceptability of a pesticide that may present high cancer risks to consumers but much lower risks to farmworkers and applicators than would the most likely chemical replacement (a trade-off for which EPA's decision on EDB has been criticized)?⁴²⁴ How are we to compare pesticides which present risks of such non-cancer "endpoints" as birth defects,⁴²⁵ reproductive failure,⁴²⁶ acute poisonings,⁴²⁷ and neurological defects?⁴²⁸ And then, of

at 590-92 n.138).

421. See Hornstein, *supra* note 7, at 592-604 (explaining inability of expected utility theory to accommodate equitable considerations).

422. See *supra* text accompanying note 368 (discussing EPA's traditional focus on carcinogenicity in cancellation and suspension proceedings). The importance of carcinogenicity is highlighted by the Agency's current "risk-based" objection to the Delaney Clause of FFDCA Section 409 (which appears flatly to prohibit any residue in processed foods of any pesticide which induces cancer in man or animal). EPA refused in 1988 to give the Clause its apparent meaning because, to do so, could create disincentives to the development of new, safer chemicals, and so retard the replacement of older, higher risk pesticides already on the market. See 53 Fed. Reg. 41,104, 41,109 (1988).

423. See Correia, *supra* note 408, at 875-78; Marina M. Lolley, Comment, *Carcinogen Roulette: The Game Played Under FIFRA*, 49 MD. L. REV. 975, 987-88 (1990).

424. See William R. Havender, *EDB and the Marigold Option*, Jan.-Feb. 1984 REG. 13, 16 (banning EDB in the name of cancer risks among consumers lead to a more volatile, alternative fumigant which presented increased risks to grain milling workers). In addition to arguing that EPA made an unjustifiable trade off, Havender also criticizes the Agency's conclusion that EDB presented significantly high cancer risks to consumers. See *id.* at 14 ("current average levels of [EDB] exposure do seem quite safe").

425. See, e.g., *Chemical Exposure During Pregnancy Linked to Fetal Death, Birth Defects*, 15 Chem. Reg. Rep. (BNA) No. 49, at 1790 (Mar. 13, 1992) (women exposed to pesticides during first trimester of pregnancy have higher-than-expected numbers of congenital abnormalities); *Study Links Paternal Jobs, Birth Defects*, 15 Chem. Reg. Rep. (BNA) No. 32, at 1129 (Nov. 8, 1991) (male silvicultural workers exposed to pesticides sire children with higher-than-expected numbers of congenital abnormalities).

426. See MARC LAPPE, *CHEMICAL DECEPTION* 41-42 (1991) (sterilization of male grape pickers caused by DBCP).

427. See *supra* note 140 and accompanying text.

428. See, e.g., *Data Extrapolation From Animal to Human From Neurotoxicity Advised by Science Panel*, 16 Chem. Reg. Rep. (BNA) No. 10, at 516 (June 5, 1992) (link between pesticides and neurotoxic effects); *Long-term Exposure To Organophosphates May Lead to Chronic Neurological Effects*, 15 Chem. Reg. Rep. (BNA) No. 33, at 1146 (Nov. 15, 1991) ("study of 90 male pesticide applicators from 10 New York counties indicates that long-term, low-level exposure to organophosphate

course, trade-offs must somehow be negotiated among risks to existing human populations and those posed to future generations (say, through groundwater contamination⁴²⁹) or to fish and wildlife.⁴³⁰ The difficulties among each of these myriad choices, moreover, will likely be compounded by a level of risk aversion which shifts depending on whether there exists a reasonable, non-chemical pest control alternative to the pesticide under consideration. Issues such as these cannot be resolved simply by comparing even perfect stochastic estimates of the frequencies of harm. The issues involve both quintessentially political questions as well as the possibility that the collective risk preferences themselves can be shifted by government action (say, through policies that overcome market barriers to low-input agriculture and thus create alternative, non-chemical policy options for political decisionmakers).

None of this should be taken to diminish the obvious importance of science and risk analysis. What should be diminished, rather, is devotion to a system of decisionmaking that aspires *ex ante* to a comprehensive, fully synoptic analysis of environmental risks as a predicate to policy formulation. Although the trend in environmental law (as in administrative law in general) has generally been toward comprehensive rationality, this policymaking strategy is no more "superior" to other decisionmaking strategies than a hammer is superior to a screwdriver: its appropriateness depends on the task at hand. As Dean Diver found, incrementalism possesses the singular ability to accommodate uncertainty and diversity⁴³¹ whereas some amount of *ex ante* policy specification through comprehensive planning and priority-setting can avoid resource intensive *ex post* requirements for policy elaboration.⁴³² What proponents of elaborate risk-reduction programs seem to have forgotten is that solving environmental problems cannot be done with only one type of tool: "a fully mature theory of policymaking," Diver found, "should be able to accommodate both [incrementalism and comprehensive rationality], with each as master in its appropriate realm."⁴³³

The history of pesticide regulation—replete with cancellation, suspension, and reregistration efforts that are slowed by the ostensible demands of science into a glacial pace—not only underscores the warnings Diver made of hyper-rationality,⁴³⁴ but also warns us of the political uses to which science can be

pesticides may result in chronic neurological effects").

429. See D. FAIRCHILD, GROUNDWATER QUALITY AND AGRICULTURAL PRACTICES 292 (1987) (groundwater contamination by pesticides in the United States has grown from 12 states finding 12 different pesticides in groundwater to at least 23 states contaminated by 17 different chemicals).

430. See CARSON, *supra* note 119, at 103-52.

431. See Colin S. Diver, *Policymaking Paradigms in Administrative Law*, 95 HARV. L. REV. 393, 430 (1991).

432. *Id.*

433. *Id.* at 430.

434. *Id.* at 429 ("According to a 1980 study, [Federal Trade Commission trade regulation rule-makings] 'take four to five years or more to complete' . . . [and may nonetheless suffer from poor

put. What began in the 1964 and 1972 FIFRA Amendments as an attempt to correct an inefficient and unrestrained market in pesticide use, became through the demands of risk analysis an analytical treadmill. The congressional use of scientific proceduralism as a device to ensure FIFRA's ineffectuality should stand as a warning to those committed to scientific environmental policy that there indeed can be too much of a good thing. So too should FIFRA's ineffectiveness warn us that risk analysis can pose political dangers. The politics of pesticides are complex, reflecting a mixture of republican moments, interest-group pressures, and unprompted congressional attention to important albeit dry matters of administrative management.⁴³⁵ A requirement that policy formation be justified only in the language of risk analysis might not only strip environmental politics of its republican moments, but it might structurally favor during the "off-season" of implementation many of the special interests that government seeks to regulate.

But perhaps the larger danger of risk-reduction methodologies is that they can become the tail that wags the dog, forcing EPA to define its mission away from serious analysis of environmentally sustainable policies. So demanding has risk analysis been in pesticide regulation that it has distracted EPA from any serious attention to the underlying reasons why pesticides might be over-used in the first place or to developing policies (or proposing legislation) that might encourage low-input agriculture. In short, as has been noted by others, EPA has been transformed from an agency in search of an environmental ethic into one in search merely of "consistency" and "follow-up,"⁴³⁶ a "professional agency with no environmental soul."⁴³⁷ Thus, although FIFRA allows EPA to conduct a risk-benefit analysis of pesticides in which benefits

quality of decisions] measured by both political accountability and technical accuracy").

435. The 1988 FIFRA Amendments, in particular, may reflect Congress' willingness sometimes to transcend interest-group pressures even in the absence of any countervailing "republican moment." In 1988, Congress was presented with a "package" of amendments to FIFRA, mostly designed to regularize the reregistration process, that had been negotiated by a coalition of environmental, chemical, and consumer groups. See Anthony J. Nownes, *Interest Groups and the Regulation of Pesticides: Congress, Coalitions, and Closure*, 24 POL'Y SCIENCES 1, 9-11 (1991). Not only did Congress enact the package in the interest of getting FIFRA "back on track," but it eliminated the indemnity requirement which had hamstrung EPA's regulatory zeal since 1972—even though there were no apparent political rewards for doing so in light of the failure of the private parties to include this policy change in their proposed package. *Id.* at 16 ("it should not be overlooked that [the 1988 Amendments] brought an end to the indemnity provisions which had engendered bitter conflict between long time adversaries While groups can set the agenda (by reducing the level of conflict between them), elected officials make the ultimate decisions"). But see Christopher J. Bosso, *Transforming Adversaries into Collaborators*, 21 POL'Y SCIENCES 3, 20 (1988) ("[f]or Congress to rely on 'predigested policies' for successful policy formation says volumes about its own institutional capacities, something many interest group theorists inexplicably ignore"). On the 1988 Amendments generally, see Scott Ferguson & Ed Gray, *1988 FIFRA Amendments: A Major Step in Pesticide Regulation*, 19 ENVTL. L. REP. (ENVTL. L. INST.) 10,070 (Feb. 1989); Pamela A. Finegan, Comment, *FIFRA Lite: A Regulatory Solution or Part of the Pesticide Problem?*, 6 PACE ENVTL. L. REV. 615 (1989).

436. Hynes, *supra* note 121, at 171.

437. *Id.* at 140 (quoting Thomas Jorling, former EPA Assistant Administrator).

might be measured against alternative non-chemical pest control options, EPA is wary of assuming the informational burdens of such an inquiry; accordingly, its benefits assessments "do not generally contain detailed economic analyses of alternative nonchemical or IPM strategies . . . [thereby placing] the economic value of [such measures] near zero . . . [and] overstat[ing] the economic benefits of the individual pesticide under review as well as the impact of pesticide cancellation."⁴³⁸ So too, until recently the Agency failed to appreciate that risk-based decisionmaking effectively subsidizes conventional pesticides (which are protected from removal by the scientific demands of Special Review and formal cancellation proceedings) and burdens newer, nonconventional pesticides such as pheromones and microbials (which must run the gamut of testing analysis before registration).⁴³⁹ Even today, as EPA faces criticism even from its own Science Advisory Board for being insufficiently attentive to initiatives that can reduce agricultural inputs,⁴⁴⁰ it remains leery of any such undertaking because it fits poorly with the Agency's organizational emphasis on managing data and making risk-based reregistration decisions under FIFRA.⁴⁴¹

Lest my criticism be misunderstood, I am not arguing for the expungement of science or quantitative analysis from pesticide regulation. It is too late in the day simply to frame environmental law reform as a matter of choosing politics over science. I am arguing, however, for better use of environmental politics—especially political action that reflects the earmarks of republican moments—to avoid the uncritical reliance on risk analysis during implementation. And I am arguing for better use of science and quantitative analysis, to highlight reasonable cause-oriented reforms that can obviate the need for our current obsession on quantifying and ranking environmental effects. The indications are strong that the current regulatory apparatus has wrung from our industrial and transportation systems most of the easy, cost-effective gains in environmental protection.⁴⁴² Precisely because further gains are necessary, but will not be as easy, there is a need for the best politics (although not

438. NATIONAL RESEARCH COUNCIL, *supra* note 122, at 218; accord *Environmental and Economic Benefits of Low-Input Farming: Hearing Before a Subcomm. of the House Comm. on Government Operations*, 100th Cong., 2d Sess. 29-30 (1988); D. HUETH & D. BOTTRELL, INTEGRATED PEST MANAGEMENT AND NONCHEMICAL ALTERNATIVES IN EPA'S ANALYSES OF PESTICIDE BENEFITS 3 (1986) ("It was apparent that the [nonchemical] alternatives are seldom seriously considered in the analyses. The decision to exclude the alternatives may be due to the lack of quantitative data on the alternatives or because of value judgments made by the [Science Support Branch] or [Economic Analysis Branch]").

439. See POLICY CONSTRAINTS RESOLUTION TEAM, *supra* note 58, at 14-17.

440. See EPA SCIENCE ADVISORY BOARD, *supra* note 27, at 22 ("preventing pollution at the source—through . . . less-polluting transportation systems and farming practices, etc.—is usually a far cheaper, more effective way to reduce environmental risk, especially over the long term").

441. See generally HUETH & BOTTRELL, *supra* note 438.

442. See Krier, *supra* note 20, at 24 (explaining diminishing rates of return).

necessarily the most voluminous legislation) and the best science (although not necessarily the most exhaustive inquiries) that we can muster.

Reform of pesticide regulation is in theory, and will probably soon prove to be in practice, a logical starting point for self-conscious attention to cause-oriented reform. FIFRA reform legislation was reported from most of the relevant congressional committees near the close of the 102nd Congress, and has been reintroduced early in the 103rd.⁴⁴³ Congressional attention to pesticides will be driven by the often-noted implications of the proposed North American Free Trade Agreement for acceptable levels of pesticide residues⁴⁴⁴ and the Ninth Circuit's recent holding in *Les v. Reilly*, which will require EPA to revoke tolerances and cancel registrations for some twenty-five or more pesticides⁴⁴⁵ unless affected by congressional action. A recently released major study by the National Academy of Sciences has focused attention on the EPA's inadequate attention to the tolerance of children to pesticide residues.⁴⁴⁶ And, rounding out the indicators of increased political attention, is a newly-elected vice president who has argued for the need to reduce pesticide use.⁴⁴⁷

Unfortunately, the expected upsurge in public attention to pesticides will be largely squandered if the congressional debate is framed, as it is likely to be, solely in terms of "risk." By all indications, FIFRA reform will focus on administrative improvements to expedite risk-based decisional processes for reregistration and cancellation.⁴⁴⁸ And the debate over food safety legislation

443. See Keith Pitts, Staff Director, House Subcomm. on Department Operations, Research, and Foreign Agriculture, Comm. on Agriculture (telephone conversation with Donald Hornstein, Sept. 21, 1992).

444. See, e.g., *NACA Sees Food Safety Bills Introduced Early in New Congress*, 16 Chem. Reg. Rep. (BNA), No. 28, at 1228 (Oct. 9, 1992) (bills to "modernize" the Delaney Clause's zero-risk standard for pesticide residues, now expected to be among the first pieces of legislation introduced in the 103rd Congress, "will likely be tied to consideration of the North American Free Trade Agreement . . . [because] a substantive difference between the U.S. regulatory system and other nations' systems is the reliance on testing of pesticides based on the maximum tolerated dose levels for carcinogenic effects") [hereinafter *NACA Sees Food*].

445. See *Federal Court Grants Stay of Mandate in Delaney Clause Case*, 16 Chem. Reg. Rep. (BNA) No. 29, at 1243 (Oct. 16, 1992) (application of the Ninth Circuit's ruling, which will affect up to 25 pesticides, will be delayed in the "worst-case" until mid-1993 when the Supreme Court might rule on an expected petition for certiorari); *NACA Sees Food*, *supra* note 444, at 1228 (food safety legislation "will be one of the first bills introduced when the new Congress convenes in January" 1993).

446. See NATIONAL RESEARCH COUNCIL, PESTICIDES IN THE DIETS OF INFANTS AND CHILDREN 8-12 (1993) (recommending that EPA needs to acquire more, and better, data on the risks of pesticide residues to children).

447. See ALBERT GORE, JR., *EARTH IN THE BALANCE* 141 (1992) ("Do we really need all these poisons? One of the most extensive studies of pesticide use ever conducted, by Cornell University, concluded in 1991 that farmers who used natural alternatives to chemical control of pests (such as integrated pest management and crop rotation) could abandon many pesticides and herbicides without reducing yields at all and without significant increases in the price of food").

448. See *Pesticide Safety Improvement Act of 1991: Hearings on H.R. 3742 Before the Subcomm. on Dept. Operations, Research and Foreign Ag. of the House Comm. on Ag.*, 102d Cong., 1st & 2d Sess. 4 (1992) (legislative proposal to change cancellation proceedings from formal adjudication to

may well be dominated by the "Delaney paradox" (claiming that the Delaney Clause increases aggregate carcinogenic risk by prohibiting the registration of new pesticides with safer carcinogenic profiles than older, existing ones that are awaiting reregistration or are otherwise permissible under FFDCA). The Delaney debate can be expected to focus on an esoteric battle between those who prefer a specified one-in-one-million standard of acceptable risk⁴⁴⁹ and those who prefer the unspecified requirement of "reasonable risk."⁴⁵⁰ Although some discussion of risk methodologies is unavoidable and probably beneficial, there is every reason to hope that the debate can be supplemented by formulation of a concrete, long-overdue framework for reducing inefficient pesticide use.

There may well be other decisional criteria, and certainly there are numerous other policy options, that should guide public programs for low-input agriculture. But the critical point is that any significant development by Congress along these lines would begin the project of reclaiming environmental law and policymaking from the failure that has marked twenty years of modern pesticide regulation. Virtually any meaningful reform along the lines suggested here, moreover, would indicate how creative and pragmatic government programs can create real policy alternatives within a framework that would have us simply choose among the risks we like least. More broadly, a thoughtful congressional initiative on preventing unnecessary pesticide use could mark a new beginning for integrating science, economics, and politics in environmental protection.

informal rulemaking, and to build in informational incentives into the reregistration process). Certainly I am not arguing that procedural improvements to FIFRA, by themselves, are unimportant. Indeed, I am currently a consultant to the Administrative Conference of the United States working on recommendations along just these lines.

449. See *Food Safety Issues: Hearings Before the Subcomm. on Dep't Operations, Research and Foreign Ag. of the House Comm. on Ag. H.R. Doc. No. 58, 102d Cong., 2d Sess. 268 (1992)*.

450. Compare S. 1074, 102d Cong., 1st Sess. (1991) (proposing 1-in-1-million risk standard) with H.R. 2342, 102d Cong., 1st Sess. (1991) (arguing for a reasonable risk standard).